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Cover & contents pictures of Stephanie Gilmore by Marcus Bell © 2015/6

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# ON A WAVE

## STEPHANIE GILMORE

Six times world champion on the Women's ASP World Tour, Stephanie Gilmore has achieved a huge amount in her sporting career, but still manages to find time to pursue her passion for photography. She's now a Nikon Ambassador and *Camera* managed to catch up with her during a brief break in her busy competition schedule.

**INTERVIEW BY PAUL BURROWS**

Photograph by Marcus Bell, copyright 2015.

# S

**STILL ONLY** 27, Stephanie Gilmore already has a decade of professional surfing competition behind her. In that time she's won more than 20 elite world tour events and been crowned women's world champion on six occasions, including in 2007 which was her first full year on the tour. In recognition of her many achievements, Stephanie was awarded the Laureus World Sports Award – considered the most prestigious award in action sports worldwide – in 2010 and the ESPN ESPY for Best Female Action Sports Athlete in both 2011 and 2013. Despite her demanding competition program, she still finds time for the two other great loves in her life, playing the guitar and photography.

"I have always been a visual person," Stephanie explains, "so I've always preferred imagery over text. I got into photography around 2008 which was my second year of travelling the world for professional surfing. I started to buy cameras along my travels and shoot the awesome places I was visiting. I would always shoot with film because I had the time and it was an exciting feeling to have to wait and see what I captured. As the years have gone by, I'm so glad I've got images from all over my travels of the landscapes, my friends, random people and the fun times."

Not surprisingly given some of the stunning locations that she competes in around the world, travel photography is a favourite of Stephanie's, but she has other interests too.

"For sure, there have been many times in the surf when the waves are great, or the water is incredibly clear, or the sunset has made the waves really colourful, and I've really wished I've had a camera. But now I've got both a Nikon AW1 and a Coolpix AW100 which are waterproofed so I can thrash around in the surf and still capture what I'm seeing with my eyes."

The pro surfing scene attracts plenty of photographers both professionals and amateurs, but actually being part of the tour gives Stephanie a unique perspective.

"I do like to take images around events because I guess I have an intimate access, behind the scenes, to world-class athletes. There are many really cool moments to capture, but then I definitely also like to give everyone their space, especially when they're competing… or if they're an opponent of mine. There are also so many photographers constantly snapping away around the events so not much goes unnoticed."

> ***"The first camera that really helped me to fall in love with photography was a Hasselblad 501C that I bought second hand in Honolulu."***

"Travel photography is definitely what I gravitate to, mainly because that's my lifestyle in general, but I really love to capture the dynamic moods of the ocean and waves. Mother Nature provides the most incredible subjects.

"Portraits are great fun too, especially of my friends and family, so I'm getting into that a little bit more."

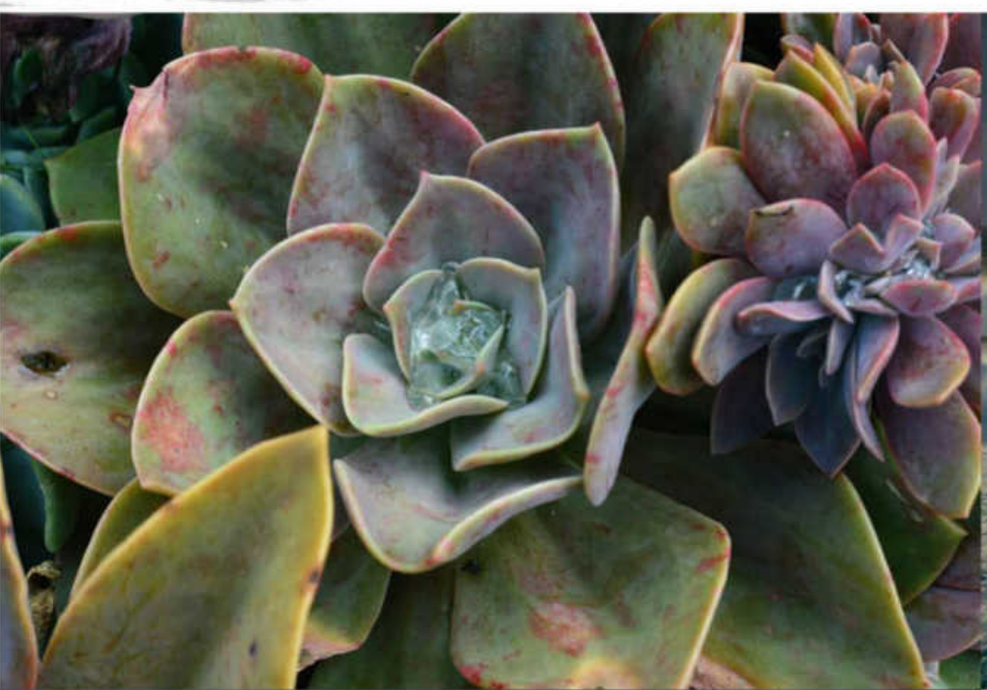
### Behind The Scenes

Of course, surfing big waves has produced some brilliant photography, so does she ever get distracted in a competition and think, 'I wish I had my camera with me'?

### Traditional Tastes

Interestingly, Stephanie's tastes in cameras are fairly traditional and she likes to be in control. She also still has an affection for film.

"The first camera that really helped me to fall in love with photography was a Hasselblad 501C that I bought second hand in Honolulu. Being fully manual,



> *Just holding onto the underwater housing while getting thrashed around by waves was pretty hard. It really increased my respect for the surf photographers out there.*


exposure settings and how to use them. And the viewfinder was great for learning about framing and composition. Lately, I've really been enjoying using the Nikon Df for the same reasons… I don't use the automatic mode so I have to get all the exposure settings right."

As far as her ideal camera is concerned, she has an interesting and challenging design brief for Nikon's designers and engineers.

"I would love a D810 with the looks of a Df and, if it was completely waterproof, that would be the icing on the cake."

Talking of the Nikon D810 which also has fairly impressive video capabilities, we asked Stephanie if shooting video interests her, especially since the action of surfing really lends itself to this medium.

"I truly love motion picture," she says, "although I haven't shot much myself. But I've been seeing a lot of both amateur film-makers and professionals shooting really cool video stuff with D-SLRs so maybe I'll grab a D810 – as it seems to be the go-to camera for video at the moment – and see what I can come up with."

### Best Shots

Perhaps not so surprisingly, Stephanie considers her best photographic experience so far to have been spending some time with Clark Little – renowned for his dramatic pictures of breaking waves – who is based in Hawaii (visit www.clarklittlephotography.com).

"Hanging with Clark was awesome," she enthuses. "He showed me a few of his tricks and we swam out into his 'office' which, of course, is similar to mine. It was cool to see him in action, getting pounded by giant shore break waves, swimming with sharks without a cage, trying to capture something both divine and unique. Just holding onto the underwater housing while getting thrashed around by waves was pretty hard. It really increased my respect for the surf photographers out there who are swimming in the most dangerous surf breaks, capturing mind-blowing photos."

Stephanie lists a number of other photographers whose work she particularly likes.

"I really admire some of the photographers who I've worked with in the surf industry, including Morgan Maassen, Trent Mitchell and Jon Frank. I love the work of Dave LaChapelle and his crazy visions – that style of cinematic photography is cool. I also love how natural Ryan McGinley's work is, he's super talented. Then there's Bob Gruen because his photos are all so iconic and I just love the stories they tell."

So what else is on Stephanie Gilmore's photography 'bucket list'?

"I'd love to do a small exhibition one day, but there's so much more to shoot before I can do that. Scandinavia is on my list of places to travel to… to surf, shoot and explore; as well as the Mediterranean."

While an exhibition of her photographs is in her long-term plans, there isn't much spare time at present to play around with making prints, even of her most favourite images.

"At the moment I'm mainly sharing my pictures online," Stephanie explains, "but I'm definitely hoping to print some of my images sometime soon. I love large image prints because they can really create a feeling in a room."

*To see more of what Stephanie Gilmore is doing visit* ***www.stephgilmore.com***

> ***I would always shoot with film because I had the time and it was an exciting feeling to have to wait and see what I captured.***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# PENTAX K-S2

REPORT BY PAUL BURROWS


The K-S2 returns to rather more conservative styling compared to the flamboyant K-S1, and it's more mid-sized than compact.

# FIT FOR PURPOSE

**Pentax maintains the D-SLR faith with another value-for-money model which offers a lot of higher-end features in an affordable and accessible package.**

As the ranks of appealing mirrorless cameras steadily swell, the D-SLR makers are having to do a bit more to attract your attention. There's no question both Canon and Nikon are doing this very well at the top end of the market, but some of their lower-priced D-SLRs are… well, a bit ho-hum compared to a comparable mirrorless model. However, this is where Pentax is at its strongest and, in fact, always has been since the legendary Spotmatics. And Pentax has also been doing its bit to keep the D-SLR in the spot light with its unmatched programs of create-your-own colour schemes (a huge hit in Japan) and, most recently, the light show and funky styling that made the entry-level K-S1 something a bit different.

It's a return to a more sober approach with the K-S2, but it continues the other Pentax strategy for keeping the D-SLR flag flying, namely to pump up the features without pumping up the price.

All the current Pentax D-SLRs represent great value for money, but it's the entry-level models where this makes the biggest difference… stepping them up to enthusiast-level in terms of capabilities and performance for less than you'd pay elsewhere. Of course, these days Pentax is a brand under Ricoh's stewardship, but wisely Ricoh Imaging has stuck with the value-added formula.

Unlike the curvier K-S1, the K-S2 is more angular in its styling and while it's not overtly retro, it's very much a traditional D-SLR in the way it looks and its classical control layout. And it's more mid-sized than compact which means a largish handgrip and a pronounced pentaprism housing. The bodyshell is glass-reinforced polycarbonate (GRP) with a stainless steel lens mount and full sealing – at 100 points – to prevent the intrusion of dust or moisture along with insulation to allow shooting in temperatures down to -10 degrees Celsius. According to Ricoh, the K-S2 is the world's smallest weatherised D-SLR and it's certainly one of the most affordable.

The optical viewfinder – still one of the main reasons for buying a D-SLR over a mirrorless camera – employs a proper glass pentaprism and gives 100 percent scene coverage. The focusing screen is interchangeable which is becoming more of a rarity even on the top-end models. A first on a Pentax D-SLR is the tilt/swing LCD monitor screen which has a tempered glass faceplate for increased resistance to scratching although, of course, the two-way hinge allows it to be folded away facing inwards for the ultimate protection when the camera is stored. The display itself is adjustable for brightness, colour saturation and colour balance.

The control layout centres around a large main mode dial with both front and rear input wheels – Pentax calls them 'e-dials' – plus a four-way navigational keypad. All the buttons are a good size and everything is clearly marked with an AF/MF switch on the lens mount binnacle along with a user-assignable multi-function 'Fx' button. There's a dedicated button for video start/stop – with the movie mode selected via a setting on the power switch – and something called the 'Self-portrait Shutter Button' which is… ahem… designed for shooting selfies (aided by the rotatable monitor screen and live view).

As is the current fashion, the K-S2 has a built-in Wi-Fi transmitter – another first on a Pentax D-SLR – with the convenience of NFC touch-and-go connectivity (the antenna is in the handgrip). The Pentax 'Image Sync' app enables remote camera control as well as wireless data transmission via both Android and iOS mobile devices.

## SHIFTING FORTUNES

On the inside the K-S2 has a 20.4 megapixels (total) 'APS-C' format CMOS sensor with an imaging area of 15.6x23.5 mm and a sensitivity range equivalent to ISO 100 to 51,200. This appears to be the same device as is used in the K-S1 and, again, it goes with an optical low-pass filter (also called an anti-aliasing filter) to optimise the resolution.

If moiré patterns are likely to be an issue with a subject, you can use the camera's 'Anti-Aliasing Filter Simulator' which is derived from the sensor-based image stabilisation system and was introduced on the first K-3 model. In practice, the AA Filter Simulator works in the reverse to image stabilisation… in other words, the sensor is shifted fractionally in order to introduce the slight blurring or 'filtering' needed to counter moiré patterns. The system has three settings – 'Off' which is obviously for prioritising resolution; 'Type 1' which is designed to balance resolution and moiré correction by shifting the sensor in a linear direction; and 'Type 2' which oscillates the sensor in a circular motion in order to optimise the blurring effect and, as a result, the moiré correction. Additionally, there's 'AA Filter Simulator Bracketing' which captures a frame with each method – and one without any correction – so you can decide which works best with a given subject.

As on the top-end Pentax D-SLRs, the sensor-shift stabilisation is also used to provide automatic levelling – or 'Horizon

**"ALL THE CURRENT PENTAX D-SLRs REPRESENT GREAT VALUE FOR MONEY, BUT IT'S THE ENTRY-LEVEL MODELS WHERE THIS MAKES THE BIGGEST DIFFERENCE…**

Correction' as Ricoh calls it – while its main job is to provide up to four stops of correction for camera shake. The K-S2's sensor is matched with Ricoh's latest generation 'PRIME M II' processor to enable continuous shooting at up to 5.5 fps, 1080/25p video recording and a range of on-the-fly image processing functions. As is the case across the Pentax D-SLR range, the S2 captures RAW files in either the Adobe DNG format or the proprietary PEF, and with a maximum image size of 5472x3648 pixels. JPEGs can be recorded in four sizes with a choice of three compression levels called Best, Better and Good. There's a single memory card slot for the SD format with support for the UHS-I speed SDHC and SDXC versions.

## PICK A COLOUR

The processing functions for JPEGs start with a set of 'Custom Image' picture presets, 11 of them comprising Bright, Natural, Portrait, Landscape, Vibrant, Radiant, Muted, Bleach Bypass, Reversal Film, Monochrome and Cross Processing. The colour presets are mostly adjustable for saturation, hue, sharpness, contrast and high/low key, but with a couple of variations. This last parameter varies the image brightness over a range of plus/minus four steps. Adjustments to both the colour saturation and the hue are shown within a RGBCMY colour hexagon display which shows the variations in colour space terms.


The Bleach Bypass preset replaces the hue adjustment with a range of eight coloured toning effects (with green as the default) while the Reversal Film preset only has an adjustment for sharpness, but the colour saturation and contrast are already boosted to replicate the look of transparency film. The Cross Processing mode has a Random setting, three preset effects and provisions for storing three favourite effects. The Monochrome 'Custom Image' has the adjustments for sharpness, contrast and high/low key plus a set of contrast filters and a selection of toning affects. The choice of filters comprises yellow, orange, red, green, magenta, blue, cyan and infrared while the toning effects range from cold-to-warm (i.e. blue-to-sepia) over plus/minus four steps. The choice of in-camera special effects has been toned down compared to earlier Pentax D-SLRs so the K-S2 offers a choice of nine that can be applied at the point of capture and these comprise Extract Colour, Replace Colour, Toy Camera, Retro, High Contrast, Shading, Invert Colour, Unicolor Bold and Bold Monochrome… a bit of an eclectic collection if ever there was one. There's a bigger choice of effects available for application post-capture (i.e. a new, edited file is created), 20 in all plus something called 'Base Parameter Adjust' which provides fine-tuning of the image's brightness, saturation, hue, contrast and sharpness.

The K-S2 has a multi-shot HDR capture function with adjustable bracketing values from +/-1.0 to +/-3.0 or, alternatively, auto adjustment and three 'strength'


**There's still the impression that** shooting video isn't a key priority on Pentax D-SLRs, but the functionality is steadily improving and the K-S2 is as capable as its closest rivals from either Canon or Nikon.

Clips are captured in the MOV format using MPEG-4 AVC/H.264 compression with a choice of 30, 25 or 24 fps recording speeds. The K-S2 has built-in stereo microphones supplemented by a 3.5 mm stereo audio input and the sound levels can be adjusted manually. The program, aperture-priority auto, shutter-and-aperture priority and manual exposure control models are available. Time-lapse movies can be created in the Motion JPEG format and there's a nifty mode called 'Star Stream' which merges multiple frames to create the effect of moving stars when recording night skies. Nine of the special effects can be used when shooting movies including Toy Camera, Retro, Unicolour Bold and Bold Monochrome. Electronic image stabilisation is available, but it's not nearly as effective as expected and can actually create an unpleasant rolling effect of its own. Moiré patterns can be an issue as, for obvious reasons, the 'AA Filter Simulator' isn't on the menu when shooting video. Nor is continuous autofocusing, but manual focusing is assisted by both a magnified image and a focus peaking display. Stick with the basics and the K-S2 does a reasonable job as a video camera, but it's hard to see it being selected primarily for this role. The good news is that it's a much more accomplished still camera.


Menu displays have been revised with crisper graphics and a choice of 12 colour schemes.


'Control Panel' screen provides quick and easy access to a long list of capture-related functions and settings.

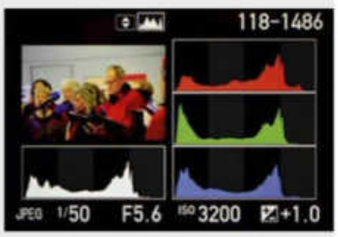


Image replay screens include a full set of histograms with a thumbnail (above), or a superimposed brightness histogram(below).


The live view screen can be configured to include an artificial 'horizon type' level display (above), grid guide and real-time histogram. A less intrusive bar-type dual-axis level display is also available.


settings called HDR1, HDR2 and HDR3. 'Auto Align' correction is available to ensure all three frames are perfectly aligned. A new 'Advanced HDR' setting is provided on the main mode dial and this also performs multi-shot capture, but with a very pronounced 'HDR look'… similar in appearance to the Impressive Art special effect on Panasonic's more recent Lumix mirrorless cameras.

Dynamic range expansion processing is available via the camera's 'D-Range' function which has separate adjustments for the highlights and the shadows, both with auto processing as the default. The 'Shadow Correction' has three manual settings, increasing in strength. New is an adjustment called 'Clarity Enhancement' which essentially works like Photoshop's Auto Levels tool to boost the contrast – by adjusting both the highlights and the shadows – to give a punchier looking image.

In-camera lens corrections are provided for distortion, vignetting, lateral chromatic aberrations and diffraction. There's also a multiple exposure facility which enables up to 2000 shots with the choice of Average, Additive or Bright exposure adjustments. You can also tick the box for an intervalometer which also allows up to 2000 frames to be recorded over intervals up to 24 hours. In the Interval Composite mode, the Average, Additive or Bright exposure adjustments are also available.

## GET TO THE POINT

The K-S2's camera control systems are standard fare for this level of Pentax D-SLR, but we're still talking an 11-point AF system and 77-segment multi-zone metering. Nine of the AF system's points are cross-type arrays and there's the choice of five 'AF Active Area' modes for selecting the points – manual single point ('Select'), manual using a cluster of points ('Select Expanded Area'), spot or automatic using either just the five central focusing points or all 11. Automatic tracking is available, and the low light sensitivity extends down to -3.0 EV (at ISO 100). Beyond this, there's a built-in LED-type illuminator to light the way.

There's the option of manual or automatic switching between the single-shot and continuous modes while, in the Custom Menu, it's possible to set the former to either focus-priority or release-priority and the latter to focus-priority, fps-priority or automatic determination of which is more important; focusing or the frame rate. Additionally, with continuous shooting you can also prioritise how the camera will deal with the first frame.

AF micro-adjustment is available (again accessed in the Custom Menu) and enables the autofocusing to be fine-tuned to the particular focusing characteristics of up to individual 20 lenses.

Contrast-detection autofocusing is used in live view with face detection and auto tracking modes while manual focusing here is assisted by a magnified view (up to 10x) and a focus peaking display.

Both centre-weighted average and spot metering methods are available as an alternative to the multi-zone measurements. The standard auto and semi-auto control modes are backed by an AE lock, up to +/-5.0 EV of compensation and auto bracketing for up to +/-3.0 EV (but shiftable over the compensation range). A total of 19 subject/scene modes are available plus an 'Auto Picture' mode which automatically selects from nine of them based on the analysis of AF, metering and white balance data. The auto select modes include the main subjects such as portraits, landscapes, action and close-ups, but also Sunset, Blue Sky and Forest.

As usual for a Pentax D-SLR, the K-S2 has a couple of extra exposure controls to supplement the standard 'PASM' set. These are sensitivity-priority auto – marked as 'Sv' on the main mode dial – and shutter-and-aperture-priority auto – marked as 'TAv' on the mode dial. In the sensitivity-priority mode, the ISO setting can be changed on-the-fly via the rear input wheel and the aperture/speed combination is adjusted accordingly. The shutter-and-aperture priority mode does exactly the opposite, so the ISO setting is automatically changed in order to maintain the selected combination of aperture and shutter speed.

The K-S2 also retains the 'green button' for one-push resetting of exposure settings. This mostly works in conjunction with the program shift function. Manual control over the apertures or the shutter speeds is available by simply turning the back or front


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Info
Test images taken with the Pentax-DA 18-135mm f3.5-5.6 ED AL (IF) DC WR zoom lens which, like the K-S2 body, is also weather-proofed. Test JPEGs exhibit excellent detailing and definition, a good dynamic range (without additional processing), and rich but not overly saturated colours (using the default Bright 'Custom Image' preset). Noise levels are commendably low all the way up to ISO 3200.
100%
Doc: 2.8mb


input wheels respectively, but full program control is resumed by pressing the green button. Alternatively, in the manual mode, pressing the green button instantly sets the aperture and shutter speed – as determined by the metering – which serve as the starting point for any subsequent adjustments.

The shutter speed range is 30-1/6000 second with flash sync up to 1/180 second. The K-S2's built-in flash has metric guide number of 12 (at ISO 100) and coverage equivalent to the 28mm focal length's angle-of-view (in the 35mm format). The modes include red-eye reduction, slow speed sync and second curtain sync. Flash compensation is available over a range of -2.0 to +1.0 EV plus there's a manual control mode which allows the output to be wound down to 1/128.

Although there's still no white balance bracketing function – a curious omission given just how loaded up with goodies the K-S2 is elsewhere – there are plenty of other control options including the Ricoh-designed 'Multi Auto White Balance' (first introduced on the CX-series compacts). This uses multi-point measurement to determine an average colour temperature in scenes where a number of different types of light source. The K-S2 also has the Pentax-designed 'Colour Temperature Enhancement' (CTE) mode which boosts the prevailing colour cast, and a 'warm' auto correction mode. This is buried in the Custom Menu as a setting called 'AWB in Tungsten Light' and there's the choice of switching between 'Strong Correction' and 'Subtle Correction', the latter maintaining more of the warmer tones. Nine white balance presets are provided (four for different types of fluorescent lighting), along with one custom settings, manual colour temperature setting and fine-tuning in both the amber-to-blue and green-to-magenta colour ranges. Additionally, the white balance setting from an image can be copied and applied to subsequent captures.

**IMPROVEMENTS IN HIGH ISO PERFORMANCE ARE WHAT TEND TO SEPARATE A NEW MODEL FROM ITS PREDECESSORS, AND THE K-S2 IS DEFINITELY SUPERIOR...**

## INFORMATION CENTRE

The main monitor can be switched between a status screen (which includes the AF points) and a dual-axis 'artificial horizon' level display. There's also a control panel display which provides direct access to 19 functions and is navigated conventionally via the four-way key-pad (the K-S2 doesn't have touch controls). Subsequent adjustments are made via the rear input wheel. There's an extensive choice of 12 display colour schemes.

The menu design has been revised (as per the K-S1) so the layout is cleaner and crisper. Each chapter is divided into stand-alone pages which are individually accessed via numbered tabs (i.e. there is no continuous scrolling). Both the layout and navigation are fairly logical with repeated right-clicks progressively accessing the sub-menus and settings, and the 'Menu' key used to step back. What hasn't changed though is the ongoing idiosyncrasy that is Pentax's policy of also using either the left- or right-click keys to switch on (or off) some functions as well as the 'OK' button. Consequently, pressing 'OK' to confirm an action will actually switch that function off (or, indeed, on).

The live view screen can be configured to include a real-time histogram, a highlight warning (a rather dramatic flashing red), one of three grid patterns, dual bar-type electronic level displays and an exposure compensation scale. The 'artificial horizon' level display can also be superimposed over the live view image, but obviously takes up quite a bit of area in the middle of the frame.

A selection of five image review/playback screens are available, including one with a luminance histogram superimposed over the image (with the option of adding a highlight warning), a thumbnail with a full set of brightness and RGB histograms, or a smaller thumbnail accompanied by a comprehensive selection capture

info. While in the replay mode, pressing the navigator's down key brings up a menu of editing functions, superimposed over the image. These include the post-capture special effects, RAW-to-JPEG file processing, cropping, resizing and 'Colour Moiré Correction' which can be applied at one of three strengths.

Thumbnails pages are available with groups of six, 12, 20, 35 or 80 images, or there's a 'Calendar Filmstrip' display which provides access to all the images taken on a particular date. At the other end of the size scale, zoom playback allows for image magnification of up to 16x.

Copyright information can be added to the Exif data, with entries for the photographer's name and the copyright holder (each up to 32 characters in length). The slide show mode can actually be configured for variable display times (three, five, ten or 30 seconds) with a choice of three transition effects.

## SPEED AND PERFORMANCE

With our reference Lexar Professional 600x 64 GB SDXC UHS-I memory card loaded, the K-S2 captured a burst of 28 JPEG/large/best images in 5.22 seconds. This represents a shooting speed of 5.36 fps which is only marginally shy of the quoted 5.5 fps. The average file size in this sequence was 12.0 MB. The 11-point phase-difference detection AF system is already well proven in earlier and existing Pentax D-SLRs. It's fast and accurate, despite the comparatively low number of points, but the contrast detection AF in both live and when shooting video is slow enough to make manual control the more desirable option. The 77-segment metering is also a good operator, and is more than capable of competently dealing with contrasty lighting situations.

The best quality JPEGs exhibit plenty of well-defined detailing, smooth tonal gradations and excellent colour fidelity. The Bright 'Custom Image' – which is the default – particularly balances saturation and accuracy beautifully, but obviously there's plenty of scope here for tweaking the way an image looks. Noise levels remain low up to ISO 3200 and still quite acceptable at ISO 6400. Definition increasingly diminishes at the highest sensitivity settings, but the colour saturation holds up very well so really all but the maximum setting of ISO 51,200 remain usable provided you don't mind a bit of graininess being evident in the areas of continuous tone.

Improvements in high ISO performance are what tend to separate a new model from its predecessors and the K-S2 is definitely superior in this regard to, say, the K-50 or even the K-5. Not surprisingly, given the new sensor, sharpness is much improved over the K-50.

## THE VERDICT

As far as enthusiast-level features go, there's very little missing from the K-S2 with probably white balance bracketing the only notable omission. OK, so a continuous shooting speed of 5.5 fps isn't going to make headlines these days, but it's fast enough for many users and everywhere else this camera punches above its weight. The feature list is truly extensive, further enhanced by the provision of a variable-angle LCD monitor screen and built-in Wi-Fi which, although it's a bit slow at present, will surely get better.

The K-S2 ticks so many boxes, it simply can't be ignored at its price point, both in terms of D-SLRs and mirrorless cameras. And it's certainly among the 'APS-C' sensor format's high achievers when it comes to image quality and, in particular, its high ISO performance.

But there is just so much scope for creative control as well as in the way JPEGs can be processed, this is a camera that will help you get wherever you want to go photographically.

## VITAL STATISTICS

## PENTAX K-S2 $925 body only

Type: Fully automatic digital SLR with Pentax K-AF bayonet lens mount.
Focusing: Automatic via 11-point wide-area system using phase-detection type CCD sensor arrays (nine cross-type arrays). Auto (11 or 5 point modes) and manual point selection. Manual or auto switching between one-shot and continuous modes, the latter with a predictive function. Sensitivity range is EV-3 - 18 (ISO 100/f1.4). AF assist provided by built-in illuminator. AF micro-adjustment for individual lenses (up to 20). Contrast-detection AF in live view and video modes. Manual focus assist in LV via magnified image and peak focus displays.
Metering: 77-zone evaluative, centre-weighted average, spot and TTL flash. Metering range is EV 0 to 22 (ISO 100/f1.4).
Exposure Modes: Program with shift, shutter-priority auto, aperture-priority auto, shutter-and-aperture priority auto, sensitivity-priority auto, metered manual, and P-TTL flash. Sensitivity priority program mode sets optimum aperture and speed for a given sensitivity setting. Nine subject programs with 'Auto Picture' mode which selects the most appropriate mode based on AF and AE data; plus 19 subject/scene modes.
Shutter: Electronic, vertical travel, metal blades, 30-1/6000 second plus 'B'. Flash sync to 1/180 second. Exposure compensation up to +/-5.0 EV in 1/3 or 1/2 stop increments.
Viewfinder: Coverage = approximately 100% vertical/horizontal. Magnification = 0.95x (50mm lens at infinity). LCD display and LED focus point indicators. Eyepiece strength adjustment built-in. Interchangeable focusing screens (choice of four).
Flash: Built-in pop-up unit with GN 12 power (ISO 100/m). External flash units connect via hotshoe. Flash compensation up to +1.0 EV and -2.0 EV in 1/3 or 1/2 stop increments. Auto, red-eye reduction, fill-in, and first/second curtain sync modes. Manual control down to 1/128 of full power.
Additional Features: Bodyshell sealed against the intrusion of dust and moisture, auto exposure bracketing (over three frames), depth-of-field preview, AE lock, dual-mode self-timer (two or 12 second delays), two users' settings memories, audible signals, remote shutter release, auto power-off (variable delay times), wired and wireless remote triggering, 28 custom functions. Compatible with Pentax SDM AF lenses.

### DIGITAL SECTION

Sensor: 20.42 million pixels (total) CMOS with 15.6x23.5 mm imaging area. Sensitivity equivalent to ISO 100-51,200. No optical low-pass filter.
Focal Length Increase: 1.5x.
Formats/Resolution: Three JPEG compression settings and RAW output. RAW+JPEG capture. RAW images captured as DNG files. Four resolution settings; 5472x3648, 4224x2816, 3072x2048 and 1920x1280 pixels. 24-bit RGB colour for JPEGs, 36-bit RGB colour for RAW files (captured at 5472x3648 pixels resolution).
Video Recording: Full HD = 1920x1080 pixels at 24 or 25 fps (PAL) and 16:9 aspect ratio. HD = 1280x720 pixels at 50, 25 or 24 fps and 16:9 aspect ratio. MPEG 4 AVC/H.264 compression. Three quality levels. Up to 25 minutes duration. Built-in stereo microphones and 3.5 mm stereo audio input. Adjustable sound levels.
Recording Media: SD/SDHC/SDXC memory cards with UHS-I speed support.
Continuous Shooting: Up to 30 frames at 5.5 fps in JPEG/large/best mode, up to nine frames with RAW capture. Low speed continuous shooting at 3.0 fps.
White Balance: Auto/manual with nine presets, one custom setting and manual colour temperature fine-tuning along the amber-to-blue and/or magenta-to-green axes. 'Colour Temperature Enhancement' (CTE) mode enhances the prevailing lighting tone and 'Multi Auto' WB modes takes multiple measurements to better balance scenes containing a number of different light sources.
Interfaces: USB 2.0, micro HDMI (Type D), 3.5 mm stereo audio input.
Additional Digital Features: Body-integrated anti-shake via sensor shift, live view functions (with contrast-detection AF and face detection), built-in sensor cleaning, 'AA Filter Simulator' (Off, Type 1, Type 2), 'AA Filter Simulator' bracketing, 7.62 cm LCD monitor (921,600 pixels resolution) with tilt/swing adjustments, sRGB and Adobe RGB colour space, 11 'Custom Image' presets (Bright, Natural, Portrait, Landscape, Vibrant, Radiant, Muted, Bleach Bypass, Reversal Film, Monochrome and Cross Processing) with fine-tuning (for contrast, sharpness, colour saturation, colour tone and high/low key), B&W capture with filter and toning effects, nine at-capture special effects (Extract Colour, Replace Colour, Toy Camera, Retro, High Contrast, Shading, Invert Colour, Unicolor Bold and Bold Monochrome) with variable effects, 21 post-capture special effects (Extract Colour, Replace Colour, Toy Camera, Retro, High Contrast, Shading, Invert Colour, Unicolor Bold, Bold Monochrome, Tone Expansion, Sketch, Water Colour, Pastel, Posterisation, Miniature, Soft, Starburst, Fish-Eye, Slim, Monochrome, Base Parameter Adjustment) with variable effects, multi-shot HDR capture (HDR1, HDR2, HDR3, +/-1.0, +/-2.0, +/-3.0 EV with auto align), dynamic range expansion processing (highlight correction – On, Off, Auto; shadow correction – Off, Low, Medium, High, Auto), 'Clarity Enhancement' processing (Off/On), lens corrections (distortion, peripheral illumination, diffraction, and lateral chromatic aberration), 'Horizon Correction' (+/-1.0 degree with stabilisation active, +/-1.5 degrees without SR), multiple exposure facility (2 to 2000 with Average, Additive or Bright auto exposure adjustment), intervalometer (up to 2000 images, two seconds to 24 hours intervals with time delay), dual-axis electronic level display, real-time histogram in live view, histogram displays in replay (luminance and RGB), highlight/shadow alerts, long exposure noise reduction (Auto, On, Off), high ISO noise reduction (Auto, Custom, Low/Medium/High, Off), adjustable image display time, playback zoom (up to 16x), auto playback (with variable display times and transitions), 6/12/20/35/80 thumbnail displays, folder and calendar thumbnail displays, copyright information input, in-camera editing (rotation, colour moiré correction, resize, cropping, protect, 'Save as Manual WB', 'Save Cross Processing', movie edit, RAW-to-JPEG processing), built-in WiFi with NFC connectivity, PictBridge and DPOF support. May be fitted with optional O-GPS1 GPS receiver which generates compass display in the monitor screen.
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Dimensions (WxHxD): 122.5x91.0x72.5 mm (body only).
Weight: 618 grams (body only without battery pack or memory card).
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# OLYMPUS
## OM-D E-M10 MARK II

REPORT BY PAUL BURROWS


The E-M10 II's restyling brings it even closer in looks to the original OM cameras. Main bodyshell covers are magnesium alloy.

# DIALLED IN

**Already an absolute gem of a camera, Olympus has made its entry-level OM-D model even more enticing with a restyled design that's pure OM in spirit, and some significant upgrades to its capabilities.**

If you haven't already made the move to mirrorless, the ongoing activities of both Olympus and Panasonic – as well as a growing choice of lenses from a variety of makers – give the Micro Four Thirds format plenty of ammunition to combat the larger sensor alternatives. If it's enough to convince you of MFT's merits, then the choice between Olympus and Panasonic is a little harder to pin down – the latter has demonstrated a remarkable capacity for giving photographers exactly what they want, but if you have any sense of camera design heritage and aesthetics, then the former's OM-D Series models tick all the right boxes.

Each successive OM-D model seems to channel the spirit of the legendary OM System 35mm SLRs more definitively than before and the second generation of the entry-level E-M10 is arguably the closest re-incarnation yet. It certainly has something to do with the size. None of the OM-D bodies are exactly bulky, but the new Mark II E-M10 is trimly petite… just like the classic OMs. Furthermore, the styling is even closer to, say, and OM-3 or OM-4, helped along by a fairly significant revising of the control layout which further emphasises the dial theme. Put simply, the E-M10 II is a pretty little thing – even more so than its predecessor – and this was always a key attraction of the legendary 35mm cameras. If you were buying on looks alone, the E-M10 II would beat all comers in the mirrorless world, but just like its predecessor, its beauty is more than skin deep.

Despite the many attractions of the higher-end OM-D models, we still crowned the original E-M10 as the pick of the litter for its hard-to-beat combination of size, styling, features, performance and price. In the fast-moving mirrorless camera

market, crowns aren't worn for long and since then Olympus has updated the E-M5 and upgraded the flagship E-M1 while Panasonic has been equally busy across its Lumix range. Yet, the E-M10 has held up well, with a bit of price snipping helping it hang onto its value-for-money edge. And now there can be an orderly succession because, if anything, Olympus has made the Mark II model even more of an appealing all-rounder.

It starts with the restyle – which we'll get to in a minute – but also includes important improvements to key elements such as the electronic viewfinder, the image stabilisation system and the autofocus functionality, along with a myriad minor revisions which all add up to a more capable package across the board.

## BETTER VIEW

The restyle mostly involves the control layout, but the central housing for the pop-up flash and viewfinder has been reshaped so it's slightly broader and looks more like that of an OM 35mm SLR while, similarly, a lip has been added to the edge of the top panel which is straight from the OM-1 lineage.

There's now an OM-1/2-style power on/off lever which sits where the main mode dial used to be on the Mark I model. On the new camera, the dial has swapped sides and, to make way for it, the front and rear input wheels have been re-aligned so they're no longer so off-set. They've also been reduced in size and have classically knurled rims – as does the main mode dial – so the top panel is almost pure 1970s in appearance save for two 'Fn' buttons and the video start/stop button. Better still, it delivers much improved ergonomics, especially in terms of changing exposure settings on-the-fly.

The EVF was one of the few areas where the original E-M10 did seem a bit low-rent, but its basic 1.44 megadots LCD panel has been replaced with an OLED-type display boasting a much higher resolution of 2.36 megadots and an increased magnification of 1.23x (equivalent to 0.62x in 35mm format terms). The improvements in sharpness, detailing, colour reproduction, dynamic range and responsiveness are all significant… and especially noticeable compared to the previous model.

The EVF has its own custom menu and here you can configure the display to one of three styles and add elements such as a real-time histogram, dual-axis level display, highlight and shadow warnings and a grid guide (chosen from a selection of four patterns). Usefully, you can configure the EVF independently of the monitor – although all the same elements are available for the latter too – and there's a new setting called the 'Simulated Optical Viewfinder' (S-OVF). This essentially extends the dynamic range – and obviously switches off the preview functions – to replicate the look of an optical finder. The dynamic range expansion is actually quite dramatic, but it's surprisingly how quickly we've become accustomed to using either the EVF or the monitor as a visual guide for exposure and white balance. Using S-OVF you have to go back to the traditional method of relying on the read-outs (although you can still sneak a peek at the monitor screen).

Auto and manual switching is available between the EVF and the monitor, and the latter remains the same tilt-adjustable TFT LCD panel as before which has a resolution of 1.037 million dots and touch controls. A new addition to these is called the 'AF Targeting Pad' which is Olympus's version of Panasonic's 'Touchpad AF' function (as on the G7 and GX8) and works in the same way, allowing you to move the AF point around via the touchscreen while using the EVF for framing and composition. Using your grip hand's thumb is the most comfortable way of working, and this is a much more convenient and efficient arrangement than fiddling around with four-way navigator keys.

As before, the monitor also provides the 'Super Control Panel' for direct access to a long list of capture-related functions. The individual functions can be

**EACH SUCCESSIVE OM-D MODEL SEEMS TO CHANNEL THE SPIRIT OF THE LEGENDARY OM SYSTEM 35MM SLRs MORE DEFINITIVELY THAN BEFORE AND THE SECOND GENERATION OF THE ENTRY-LEVEL E-M10 IS ARGUABLY THE CLOSEST RE-INCARNATION YET.**


Viewfinder eyepiece incorporates proximity sensors for auto switching between the EVF and the monitor.

'Super Control Panel' – shown here superimposed over the live view image – provides direct access to a host of capture-related functions.

Rear control layout is centred around a four-way navigator with central 'OK' button for confirming settings.

selected via touch control, but the subsequent settings are made via the front or rear input wheels. While on operational matters, the Mark II E-M10 retains the same menu design as its predecessor – and current siblings – which means just about everything beyond a few basics is done via an extensive Custom Menu and the Shooting Menu is actually quite small. It's the opposite of the way most camera manufacturers do things, but obviously you will get used to it if you're actually living with the camera on a daily basis.


## STEADY ON

Like the rest of the OM-D family, the E-M10 II employs sensor-based image stabilisation, but it now corrects for movement in five directions rather than the previous model's three.

This is the same as for the E-M5 II and flagship E-M1, but it isn't quite same system as the maximum range of correction is four stops rather than five. Nevertheless, this is still a big improvement and, as on the E-M5 II, when shooting video there's the option of using a combined 'Sensor-Shift and Digital IS' mode which is particularly effective when using the camera hand-held. Digital IS shifts the image area across the sensor (achieved via a small crop) to provide additional correction. The rest of the E-M10 Mark II's video capabilities are outlined in the separate Making Movies panel.

The sensor itself is the same 17.2 megapixels Micro Four Thirds size 'Live MOS' device as used on the previous model. It goes without an optical low-pass filter (LPF) in order to optimise the resolution. It's mated by the same 'TruePic VII' processor as before, although no doubt there have been some tweaks to various elements of performance. For example, there's a modest increase in the maximum shooting speed which is now 8.5 fps (versus 8.0 fps) with the AF and AE locked to the first frame while Full HD video recording is now possible at 50 fps with progressive scan. With continuous AF/AE adjustment the top speed increases to 4.3


**Initially video didn't seem to be** a particularly big priority for Olympus on its D-SLRs and then on the Digital Pen mirrorless cameras, but all that changed with the OM-D E-M5 Mark II and the new version of the E-M10 follows suit. It has virtually the same video package as its bigger brother which means this is a big step up from what was offered on the original model. It also means that the E-M10 Mark II offers an exceptional level of video functionality for its comparatively low price tag.

As noted in the main text, it has the 'OM-D Movie' image stabilisation options which include one that combines both the five-axis sensor-based correction with image shifting to enable smoother hand-held shooting. The electronic stabilisation involves applying a small crop of the sensor image prior to downsampling.

Full HD shooting is available at all frame rates (in all TV standard regions) with progressive scan – 60 fps, 50 fps, 30 fps, 25 fps and, crucially, 24 fps – with the option of All-Intra intraframe or IPB interframe compressions regimes (although All-I is only available at 30 fps, 25 fps or 24 fps when shooting at FHD). All-I compression optimises image quality – and is really the only option is you're planning to do a lot of editing – while IPB delivers smaller, more manageable files. With All-I compression, the bit rate is an impressive 77 Mbps and when using IPB it's still a very acceptable 52 Mbps. Importantly, an uncompressed and 'clean' video feed (8-bit, 4:2:2 colour and 24 fps, 25 fps or 30 fps) is available at the camera's HDMI terminal for recording to external devices.

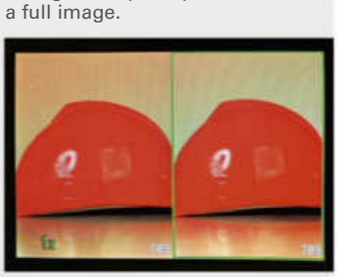
The E-M10 II doesn't shoot at 4K except for time-lapse sequences (which can be up to 999 frames), but the playback speed is limited to 5.0 fps so it's hard to see this being of much practical use. In comparison, when shooting full motion video, the camera offers a host of control options including manual control of apertures and/or shutter speeds, all 14 'Art Filters', the 'Colour Creator' adjustments, and a selection of five 'Movie Effect' settings (Art Fade, Old Film, Multi Echo, One Shot Echo and Multi Teleconverter). The E-M10 II can also add time-coding to footage and provides a seamless transition to a new file when the usual 4.0 GB size limit is reached. A new feature is called 'Clips' and allows for up to 99 short clips – of two, four, six or eight seconds duration – to be quickly and easily assembled in-camera, similar to Panasonic's 'Snap Movie' function.

The focus peaking display is available in the same choice of four colours and three intensities as for stills, and there's the option of having a real-time histogram and one of the grid guides.

On the audio side, the E-M10 II has built-in stereo microphones and provisions for manually controlling the recording levels (with a 20-step range). There's also a volume limiter and a switchable wind noise filter, but still no stereo audio input which seems a bit curious given the upgraded capabilities elsewhere. There doesn't appear to be a workaround at present and it will be a limiting factor for the serious videographer… despite the real appeal of the rest of the package. Clearly Olympus wants these users to head for the E-M5 Mark II.

The live view screen can be configured for dual-axis levels displays (top), a real-time histogram and guide grid (centre), and an additional info displays (bottom).

Replay screen options include a thumbnail with a set of histograms or a brightness histogram superimposed over a full image.



'Light Box' display provides side-by-side comparisons of two images with zooming which is particularly handy for checking focus.

fps from 3.5 fps. New is a silent shooting mode made possible by the inclusion of a sensor-based shutter which also gives a top shooting speed of 1/16,000 second (versus 1/4000 second for the conventional shutter). The sensor's sensitivity range remains the same at ISO 200 to 25,600 with a one stop 'pull' to ISO 100.

The AF and AE systems are also unchanged; the former is Olympus's 'FAST AF' contrast-detection system which employs 81 measuring points – arranged in a 9x9 pattern – with auto or manual point selection, and the option of setting a nine-point cluster for wider-area coverage. There's both auto tracking and face-detection, the latter switchable to eye-detection and further refined to catch either the right or left eye. There's also the option of combining the single-shot AF mode with a continuous manual override, and full manual focusing can be assisted by a magnified image (five settings up to 14x) or a focus peaking display. The latter is now available in an expanded choice of colours – red, yellow, white or black – and High, Normal or Low intensity settings.

Exposure control is based on Olympus's 324-point 'Digital ESP' multi-zone metering with the choice of centre-weighted average or spot measurements. Continuing a long Olympus tradition (from the OM-4, in fact), the spot metering can be biased towards either the highlights or the shadows. Additionally, there's an 'Exposure Shift' adjustment which fine-tunes each of the metering modes over a range of +/-1.0 EV in 1/6-stop increments.

The standard auto exposure control modes can be overridden via an AE lock, up to +/-5.0 EV of compensation or auto bracketing which can be set to shoot sequences of two, three, five or seven frames with adjustments of either +/-0.3, 0.7 or 1.0 EV per frame. As before, there's a selection of auto bracketing modes with, in addition to exposure, settings for white balance, flash, ISO and 'Art Filter' special effect plus a new one for focusing. Focus bracketing can be set for sequences of up to 999 shots (!) with a focus differential adjustment from Narrow to Wide over ten steps. Long sequences are also possible with the 'Art Filter' bracketing which can also include the camera's 'Picture Mode' presets so you could potentially end up with 21 variations of an image.

## COLOUR AND CONTRAST

The E-M10 II has two new 'Art Filter' effects – called Vintage and Partial Colour – bringing the total selection to 14. Additionally, the choice of 'Art Effects' is expanded to nine (from seven) and these are variously added to the original effect… which themselves are mostly adjustable too. The six 'Picture Mode' presets are unchanged and the five colour modes have adjustable parameters for sharpness, contrast, colour saturation and tonal gradation. This last parameter can be set to Normal, Auto, High Key or Low Key. The Monotone 'Picture Mode' is adjustable for contrast, sharpness and gradation, plus there's a set of contrast control filters (yellow, orange, red and green) and a choice of toning effects (sepia, blue, purple or green). You can store one modified 'Picture Mode' as a custom preset.

Supplementing the standard 'PASM' exposure control modes are 25 subject/scene modes plus the 'iAUTO' full auto mode which provides auto scene mode selection. A selection of basic manual overrides called 'Live Guides' are available when shooting in 'iAUTO' and these provide some control over colour saturation, colour balance, brightness, background blur and the blurring/freezing of movement.

The 'Live Guides' are accessed via a touch tab on the live view screen and the adjustments are subsequently applied via slider-type controls which are also operated by touch.

For the more experienced user, there's the 'Colour Creator' function and 'Highlight & Shadow' control, both of which perform like built-in Photoshop tools, namely the Saturation/Hue and Curves adjustments.

When the 'Colour Creator' is selected, the front input wheel adjusts the hue and the rear wheel varies the saturation which, of course, can be monitored in live view. The 'Highlight & Shadow' control allows you to adjust the brightness of the highlights and/or the shadows around a central point. The front wheel tweaks the highlights while the rear dial works on the shadows.

The E-M10 II also has multi-shot HDR capture (with both auto and manual modes), in-camera panorama stitching, a multiple exposure facility (with auto exposure correction), an intervalometer for recording time-lapse sequences and in-camera processing of RAW files. There's also a 'Live Composite' mode which, after a base exposure is set (between 1/1.3 to 60 seconds), maintains the brightest elements of the image (say, for example, fireworks or stars) to avoid overexposing them while capturing multiple exposures over a period of up to three hours. With each successive exposure you can watch the image being 'built' on the monitor screen as is the case with 'Live Bulb' and 'Live Time'

The monitor screen tilts and is the same 1.037 megadots TFT LCD panel as was used on the previous model.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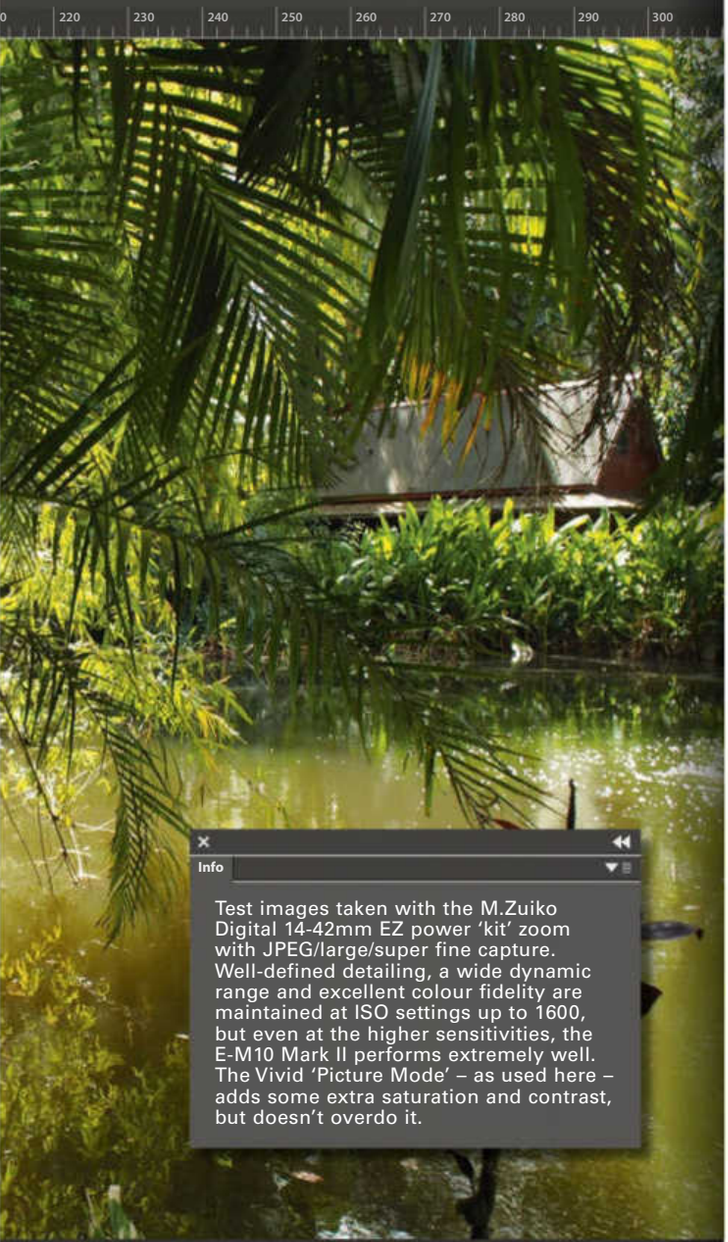
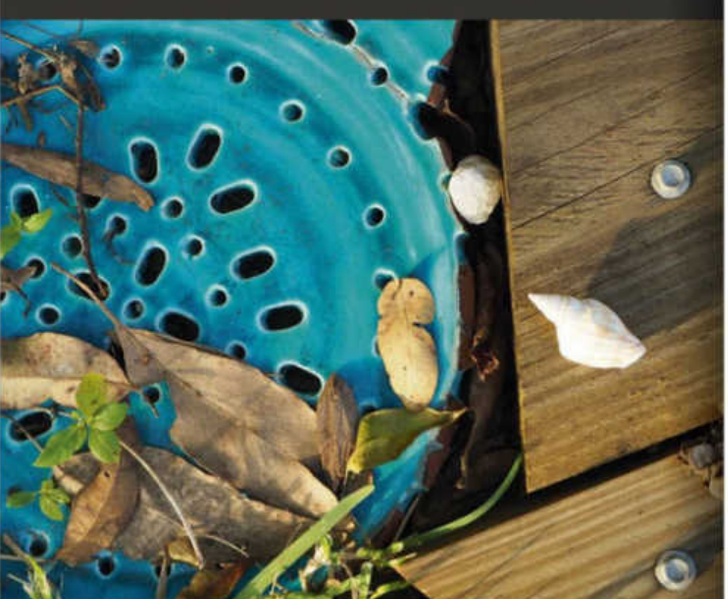
100%
Doc: 2.8mb



Info

Test images taken with the M.Zuiko Digital 14-42mm EZ power 'kit' zoom with JPEG/large/super fine capture. Well-defined detailing, a wide dynamic range and excellent colour fidelity are maintained at ISO settings up to 1600, but even at the higher sensitivities, the E-M10 Mark II performs extremely well. The Vivid 'Picture Mode' – as used here – adds some extra saturation and contrast, but doesn't overdo it.



modes which work with the shutter's 'B' and 'T' settings. Both allow for exposures of up to 30 minutes, and the image display intervals are variable.

The white balance control options comprise auto correction (with a 'Keep Warm Colour' option for use when shooting under tungsten lighting), a choice of seven presets (including for underwater), provisions for storing up to four custom measurements, and manual colour temperature control (over a range of 2000 to 14,000 degrees Kelvin). As always, Olympus does its own thing here; calling the custom measurements "one-touch white balance", and the manual colour temperature settings "custom white balance". Fine-tuning is available for all the presets, the four custom measurements and both auto modes.

Despite being ultra-compact in size, the E-M10 Mark II still packs in a built-in flash which is concealed in the central housing and popped up by pushing the OM-style power on/off lever forward another notch. It has a metric guide number of 8.2 (at ISO 200) which is a little more powerful than before and it can serve as the commander in a wireless TTL flash set-up (a feature Olympus originally pioneered on its D-SLRs). Alternatively, manual control is available with an adjustable output down to 1/64. The shooting modes include fill-in, slow speed sync and second curtain sync. The maximum flash sync speed is 1/250 second.

## UNDER REVIEW

Post-capture, the E-M10 II's in-camera editing functions for JPEGs comprise Shadow Adjust (for dynamic range expansion), Red-Eye Fix, Aspect, B&W, Sepia, Saturation, Resize and e-Portrait. The 'Art Filter' effects aren't available for application post-capture.

The image review/replay screens can be configured to include a thumbnail image with a full set of histograms (i.e. brightness and RGB channels), a larger brightness-only histogram superimposed over the image, highlight and shadow warnings and a 'Light Box' display for the side-by-side comparison of two images (complete with zooming which is very handy for checking focus). The thumbnail pages comprise four, nine, 25 or 100 images plus a calendar display, but as with the replay screens, you can choose which ones you want to be available via the Custom Menu. Touch controls are available for browsing, zooming and scrolling through the thumbnails. Like its predecessor, the E-M10 II has a built-in


'Highlight & Shadow' control allows the brightness of the highlights and/or the shadows to be adjusted around a central point… in a similar fashion to Photoshop's Curves.


Thumbnail pages can be configured to four, nine, 25 or 100 images plus a calendar display. You can preselect any combination you want via the Custom Menu.


The Custom Menu is extensive and includes a page dedicated to the EVF's settings.

WiFi module for image transfer, remote control of various functions and a live view feed. Instead of using NFC for easier connecting with mobile devices, the camera generates a QR code which is scanned via the O.I. Share app to configure the set-up.

Both the Android and iOS operating systems are supported and even some of the touch controls transfer to the device, including autofocusing and shutter release.

## SPEED AND PERFORMANCE

Loaded up with our reference memory card – Lexar's Professional 64 GB SDXC format UHS-I speed device – the E-M10 II captured a sequence of 25 JPEG/large/super fine frames in 2.922 seconds, representing a shooting speed of 8.55 fps… which pretty much

nails Olympus's quoted spec. For the record, the average file size was 8.2 MB.

Although the autofocusing is via contrast-detection measurement, in the single-shot mode it's fast and reliable, especially when using either face- or eye-detection when it locks onto the subject in an instant. In continuous mode, the focus tracking is reasonably capable, but not in the same league as the hybrid systems using phase difference-detection. Olympus's 'Digital ESP' metering is now well-proven and continues to deliver accurate exposures with the E-M10 II, even in challengingly contrasty situations.

The original camera delivered exceptional performance and, given it shares pretty much the same hardware here, the Mark II model does likewise, although it's likely there's been some software-related tweaks between the two models based on user feedback. As before, the superfine quality JPEGs exhibit high levels of crisply-defined detailing and very smooth tonal gradations. Again the dynamic range is wider than might be expected for a smaller-sized sensor. The colour reproduction is excellent, but of course there's plenty of scope for fine-tuning here via the 'Picture Control' presets. Vivid, in particular, delivers really punchy images with boosted saturation and contrast, but without overdoing it.

Noise levels remain acceptably low up to ISO 3200 and both the ISO 6400 and 12,800 settings are still usable, but exhibit some graininess in the areas of continuous tone while there's a small loss of definition. As we've noted with all the OM-D models, the MFT imaging performance doesn't give anything away to the rival CSCs with a larger 'APS-C' sensor, especially in terms of the high ISO capabilities.

## THE VERDICT

We really loved the original E-M10 and the Mark II model has even more appeal thanks, for starters, to its revised styling and ergonomics which make it even closer in spirit to one of the classic OM 35mm SLRs. It's unquestionably the prettiest mirrorless camera on the market – even more so than the E-M5 II and the sheer smallness really does make the most of the configuration… further enhanced by the EVF's major upgrade which is also another big plus.

We also picked the first E-M10 as the pick of the OM-D litter – particular in terms of its value for money – but now there's much stiffer competition in the shape of the brilliant E-M5 II so it's harder to be quite so definitive. Nevertheless, the E-M10 Mark II still stands out as far as great value is concerned which makes it easier to contemplate as a second system if you're not quite ready to give up your D-SLR just yet. It makes a brilliant travel camera, for example – especially with the 'pancake' 14-42mm power zoom – and certainly has everything the enthusiast-level shooter is going to want, backed up by a superlative imaging performance. But the bottom line is that it's even more intuitive and enjoyable to use even with the menu system's idiosyncrasies so it's more likely to be your 'go to' camera no matter what you're shooting.

## VITAL STATISTICS

## OLYMPUS OM-D E-M10 MARK II $999

with M.Zuiko Digital 14-42mm f3.5-6.3 EZ ED MSC zoom lens.

Type: Fully automatic, interchangeable lens digital camera with Micro Four Thirds System bayonet lens mount.
Focusing: Automatic 81-point wide-area using contrast-detection measurement via the imaging sensor. Focus points may be selected manually or automatically by the camera. Manual switching between one-shot and continuous AF modes. Face/eye detection and auto tracking. Continuous manual override available with single-shot mode. Focus assist via magnified image (3x/5x/7x/10x/14x) and focus peaking display (Red, Yellow, White or Black; High, Normal or Low intensity).
Metering: 324-point 'Digital ESP' (i.e. multi-zone), centre-weighted average, spot (2.0%) with highlight/shadow bias, and TTL flash. Metering range is EV -2.0 to 20 (ISO 100/f2.8).
Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, TTL auto flash and TTL flash. Plus 25 subject/scene programs. Automatic scene detection in 'iAUTO' mode.
Shutter: Electronic, vertical travel, metal blades, 60-1/4000 second plus B and T (both up to 30 minutes). Flash sync to 1/250 second. Exposure compensation up to +/-5.0 EV in 1/3, ½ or full stop increments.
Viewfinder: EVF OLED-type with 2.36 megadots resolution, 100 percent coverage and 1.23x magnification; or tilt-adjustable 7.62 cm TFT LCD monitor panel (1.037 megadots) with touch screen controls. Both have scale/grid, real-time histogram and info displays plus a zoom function. Auto/manual switching between EVF and monitor. EVF has 'Simulated Optical Viewfinder' (S-OVF) setting which mimics the appearance of an optical finder.
Flash: Built-in pop-up unit with GN 8.2 power (ISO 200/metres). Auto, fill-in, red-eye reduction, front/rear sync and slow speed sync modes plus TTL wireless flash control. Flash compensation range of +/-3.0 EV in 1/3 stop increments. Manual control down to 1/64 of full power. External flash units connect via hotshoe.
Additional Features: Magnesium alloy bodyshell, AE/AF lock, auto exposure bracketing (up to +/-1.0 EV over two, three, five or seven frames), depth-of-field preview, programmable self-timer (1 to 30 second delays, 1 to 10 frames, variable intervals), audible signals, auto power-off, hard-wired remote triggering, silent shooting mode, 'Anti-Shock' low-speed continuous shooting mode (using sensor shutter), 104 custom functions.

### DIGITAL SECTION

Sensor: 17.2 million (total) pixels Live MOS with 17.3x13.0 mm imaging area and 4:3 aspect ratio. No low-pass filter. Sensitivity equivalent to ISO 200-25,600 (extendable to ISO 100).
Focal Length Magnification: 1.97x.
Formats/Resolution: Four JPEG compression settings, RAW output (lossless compression) and RAW+JPEG capture. Eight resolution settings (four set at any one time) at 4:3 aspect ratio; 4608x3456, 3200x2400, 2560x1920, 1920x1440, 1600x1200, 1280x960, 1024x768 and 640x480 pixels. Eight resolution settings (four set at any one time) at 3:2 aspect ratio; 4608x3072, 3216x2144, 2544x1696, 1920x1280, 1584x1056, 1296x864, 1008x672 and 624x416 pixels. Eight resolution settings (four set at any one time) at 16:9 aspect ratio; 4608x2592, 3200x1800, 2560x1440, 1920x1080, 1536x864, 1280x720, 1024x576 and 640x360 pixels. Eight resolution settings (four set at any one time) at 1:1 aspect ratio; 3456x3456, 2400x2400, 1920x1920, 1440x1440, 1216x1216, 960x960, 768x768 and 480x480 pixels. 24-bit RGB colour for JPEGs, 36-bit RGB colour for RAW files. RAW files captured at 4608x3456 pixels.
Video Recording: Full HD at 1920x1080 pixels; 60, 50, 30, 25 or 24 fps and 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression. Fine and normal quality modes. HD at 1280x720 pixels, 50 fps or 25 fps and 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression. Superfine, fine and normal image quality modes with IPB compression, or ALL-Intra compression. HD at 1280x720 pixels, 25 fps and 16:9 aspect ratio, AVI format with Motion JPEG compression. Built-in stereo microphones with adjustable levels and a wind filter. Maximum recording time is 29 minutes and 59 seconds, but a new file is automatically started when the 4.0 GB size limit is reached. Movie clips limited to 2.0 GB file size in AVI.
Video Features: Five 'Movie Effects' (Art Fade, Old Film, Multi Echo, One Shot Echo and Movie Tele Converter), 'Clips' mode (up to 99 short clips – maximum of eight seconds – assembled in-camera), 'Movie+Photo' mode, silencing function, time lapse recording, time code support, hybrid sensor shift/electronic image stabilisation.
Recording Media: SD/SDHC/SDXC memory cards with UHS-I and UHS-II support.
Continuous Still Shooting: Up to 79 frames at up to 8.5 fps (JPEG/large/super fine) or up to 41 RAW frames. Low speed continuous shooting at 4.3 fps with continuous AF/AE adjustment.
White Balance: TTL measurement via image sensor. Auto measurement, auto warm, seven presets and four custom settings. White balance compensation (amber-to-blue and/or green-to-magenta) in all presets plus white balance bracketing over three frames. Manual colour temperature setting from 2000 to 14,000 degrees Kelvin.
Interfaces: Multi-connector (USB 2.0 and NTSC/PAL composite video) and micro HDMI (Type D).
Additional Digital Features: Body-based image stabilisation with five-axis correction, built-in sensor cleaning, dual-axis level display, Adobe RGB and sRGB colour spaces, long exposure noise reduction (Auto, On, Off), high ISO noise filter (Off, Low, Standard, High), six 'Picture Modes' (i-Enhance, Vivid, Natural, Muted, Portrait and Monotone), one user-defined 'Picture Mode', adjustable 'Picture Mode' adjustments (Contrast, Sharpness, Saturation and Gradation – Auto, Normal, Low-Key, High-Key), Monochrome mode has four contrast filters and four toning effects, 'Colour Creator' function, 'Highlight & Shadow' control, 14 'Art Filter' effects applied at capture (Pop Art, Soft Focus, Pale & Light Colour, Light Tone, Grainy Film, Pin Hole, Diorama, Cross Process, Gentle Sepia, Dramatic Tone, Key Line, Watercolour, Vintage and Partial Colour), nine 'Art Effects' (Soft Focus, Pin Hole, Frames, White Edges, Starlight, Filter, Tone, Blur and Shade Effect – availability varies according to the filter effect), 'Photo Story' function (five patterns), multiple exposure facility (with auto exposure adjustment), intervalometer (up to 999 frames), auto bracketing modes (AE, WB, ISO, flash, 'Art Filters' and focus), 'sweep' panorama mode, multi-shot HDR capture (two auto modes, five manual settings for three, five or seven frames), 'Live Composite' mode, 'Live Time' and 'Live Bulb' modes, 'Super Control Panel' screen, highlight and shadow alerts (adjustable thresholds via histogram), guide grids (choice of four), 'Shading Compensation' vignetting correction, 'Keystone Compensation' correction, long exposure noise reduction, high ISO noise reduction, adjustable image display time, auto image rotation, slide show (with a choice of music and transitions), playback zoom (up to 14x), 4/9/25/100/calendar thumbnail displays, calendar thumbnail display, index display, 'My Clips' display, 'Lightbox' side-by-side comparison display, in-camera editing functions (Shadow Adjust, Red-Eye Fix, Aspect, B&W, Sepia, Saturation, e-Portrait and Resize), in-camera RAW-to-JPEG conversion, in-camera RAW image overlay, copyright info, DPOF and PictBridge support, built-in WiFi module.
Power: One 7.2 volt/1210 mAh rechargeable lithium-ion battery pack (BLS-5 type).
Dimensions (WxHxD): body only = 119.5x83.1x46.7 mm.
Weight: body only = 350 grams (without battery pack and memory card).
Price: $799 body only. $999 with M.Zuiko Digital 14-42mm f3.5-6.3 EZ ED MSC zoom lens. $1199 for twin lens kit which adds M.Zuiko Digital 40-150mm f4.0-5.6 R telephoto zoom. Available in black or silver.
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REPORT BY PAUL BURROWS

# NIKON D7200


# OLD DOG, NEW TRICKS

**If you're a bit envious of what Nikon is offering on its latest 'FX' format D-SLRs, but you're a committed 'DX' user, you'll be pleased to know that the D7200 closes the gap, ensuring the smaller-sized sensor remains an attractive proposition.**

While full-35mm D-SLRs have been making headlines recently, there are still plenty of good reasons for going with an 'APS-C' size sensor instead. In the Nikon world, this is the 'DX' format and for a little while there it looked like it might be becoming the poor cousin as the company launched a steady stream of shiny new 'FX' format models. But, in quick succession, Nikon has launched the D5500 – currently the world's most compact D-SLR – and the D7200 which, as the new 'DX' flagship, gives aficionados of the smaller format some serious fire power comparable to the likes of the D610 or even the D750.

The D7200 takes over the 'DX' flagship mantle from the D7100 and, in comparison, it has a different sensor, Nikon's current-generation 'Expeed 4' processor, a much bigger buffer memory, an upgraded autofocusing

system, enhanced video recording capabilities and a variety of new features, including WiFi connectivity. Importantly, all this is designed to keep Nikon in the hunt against the Mark II version of Canon's EOS 7D.

While certainly not bulky, the D7200 isn't especially compact either – in fact, the D750 is only marginally bigger – but, as always, Nikon's emphasis is on comfortable handling and efficient ergonomics. Consequently, there's a good-sized handgrip and the control layout follows the current formula for higher-end Nikon D-SLRs and so is based on a main mode dial with front and rear input wheels, plus a multi-directional controller located on the rear panel. The monitor screen is fixed, but it's a nicely contrasty RGBW panel with a resolution of 1.299 million dots. It's supplemented by a monochrome info display on the camera's top panel which has built-in illumination. The top and bottom body covers are magnesium alloy (so is the chassis) while the rest are GRP, and all joints and junctions are sealed against dust or moisture. The D7200 has a built-in flash and a hotshoe (but no PC terminal) and it uses the same EN-EL15 lithium-ion battery pack as a number of other Nikon D-SLRs, (including the D610 and D750). An optional battery grip is available which replicates the key controls for easier shooting when the camera is being held vertically.

There are two memory card slots, both for the SD format with support for the higher-capacity HC and XC versions plus UHS-I high speed transfer, but not the faster UHS-II type. The slots can be configured in a variety of ways to allow automatic switch over when one is full ('Overflow'), simultaneous recording to both cards ('Back Up') or the separate recording of RAW and JPEG files (and this can also be done for still images and movie clips).

The viewfinder is a full pentaprism design, giving 100 percent scene coverage with 0.94x magnification. An OLED display allows for the superimposition of various warnings and notifications, including dual-axis level indicators, plus there's a switchable grid guide. Like the D750, the D7200 has a redesigned monitor-based information display, but it's still simply a passive display rather than an active control panel. However, the customisable but clunky 'Shooting Menu Bank' and 'Custom Setting Bank' are gone, replaced by a simpler and easier-to-use ten-item menu which includes, among other things, the 'Picture Control' presets, the 'Active D-Lighting' settings and HDR mode. It's definitely an improvement, but if you want to change things like the ISO or white balance on-the-fly, you still have to do it the old-fashioned way via a dedicated function button.

**THE D7200 MOVES UP TO NIKON'S LATEST-SPEC 'EXPEED 4' PROCESSOR WHICH NO DOUBT MAKES A CONTRIBUTION TO THE INCREASED SENSITIVITY RANGE VIA SUPERIOR NOISE REDUCTION PROCESSING.**


**LIKE THE D750, THE D7200 USES THE NEW MARK II VERSION OF NIKON'S 51-POINT 'MULTI-CAM 3500FX' AUTOFOCUS MODULE WHICH PRIMARILY OFFERS AN EXTENDED LOW LIGHT SENSITIVITY DOWN TO EV -3.0 (AT ISO 100).**

## HIGH-POWERED PIXELS

While the D7200's sensor has very similar specifications to the device used in the D7100 – including a maximum image size of 6000x4000 pixels – it is apparently different as evidenced by its total pixel count of 24.72 million (24.2 MP effective) and an expanded, by two stops, native sensitivity range equivalent to ISO 100 to 25,600. There are actually two further high ISO settings – i.e. 51,200 and 102,400 – but Nikon has wisely restricted these to B&W capture only, thereby eliminating any chroma noise issues.

As before, this CMOS-type sensor doesn't have an optical low-pass (or anti-aliasing) filter in order to optimize its resolution potential.

The D7200 moves up to Nikon's latest-spec 'Expeed 4' processor which no doubt makes a contribution to the increased sensitivity range via superior noise reduction processing. As noted earlier, there's also a bigger


buffer memory so the quoted burst lengths have improved quite significantly – up to 100 maximum quality JPEGs, 27 12-bit RGB RAW files or 18 14-bit RAW files. If you opt for captured compressed RAW files (which are marginally smaller in size), the burst lengths are 35 and 26 frames respectively. The maximum continuous shooting speed remains at 6.0 fps, but there's the option of a '1.3x' cropped image mode – representing an imaging area of 18x11 mm – which allows for a slightly quicker maximum shooting speed of 7.0 fps. This obviously gives a further increase in the effective lens focal length – up to 2.8x – while the maximum resolution is still pretty good at 15.3 MP which may be an acceptable trade-off for anybody who needs some instant extra telephoto power.

As on all Nikon D-SLRs, JPEGs can be recorded at one of three sizes with a choice of three compression levels and the option to set this compression to 'Size Priority' or 'Optimal Quality'. RAW files can be captured at either 12-bits or 14-bits colour depth with lossless compression or lossy compression, but in only one size. The RAW+JPEG capture can be configured to append a large JPEG with the choice of Basic, Normal or Fine compression.

Following the D810 and D750, the D7200 has an additional 'Picture Control' preset called Flat which is primarily designed for use with video recording and maximises the dynamic range, leaving everything else for adjustment post-camera (i.e. via colour and exposure grading). Obviously, though, it can still be used for still photography if you prefer to work on your JPEGs later.

Additionally, all the 'Picture Control' presets have the new Clarity adjustment parameter which varies the contrast of mid-tones to help enhance overall detailing. The colour presets also have adjustments for sharpness, contrast, brightness, saturation and hue while the Monochrome 'Picture Control' replaces the latter two with a set of B&W contrast filters (yellow, orange, red and green) and a selection of toning effects (nine colours, each with seven steps of density). There's a 'Quick Adjust' option which applies a number of tweaks collectively or, alternatively, 'Auto' adjustment can be applied and this works according to the exposure and also the position of the subject in the frame. Up to nine modified 'Picture Controls' can be stored and given a new title up to 19 characters in length.

## TAKING EFFECT

The D7200 has a small selection of 'Special Effects' settings which can be applied at the point of capture, but these are essentially 'standalone' modes – accessed via the main mode dial – so there

are no manual controls (not even exposure compensation) and even the ISO is adjusted automatically.

Probably more useful, then, are the choice of effects available as post-capture editing functions in the camera's Retouch Menu and which include 'Fish-Eye', 'Colour Outline', 'Colour Sketch', 'Miniature Effect' and 'Select Colour'.

Like most of its siblings, the D7200 has a multi-shot HDR capture function or, alternatively, the dynamic range can be expanded via Nikon's 'Active D-Lighting' (ADL) processing. Auto bracketing is available for the ADL corrections and can be set to sequences of two, three, four or five frames (which covers all the possible setting options of Off, Low, Normal, High and Extra High). There's also a multiple exposure facility and a 9999-frame intervalometer with an exposure smoothing function (which avoids excessive brightness variations between frames). In-camera corrections are provided for lens vignetting and distortion plus noise reduction for both long exposures and shooting at high ISOs (the latter with the choice of Low, Normal or High settings). As on all Nikon's higher-end D-SLRs, correction for lateral chromatic aberrations is performed automatically with JPEG capture.

## POINT DUTY

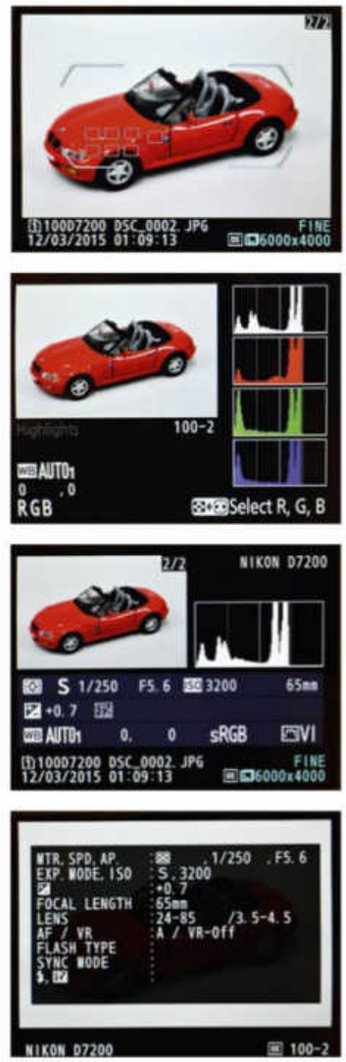
Like the D750, the D7200 uses the new Mark II version of Nikon's 51-point 'Multi-CAM 3500FX' autofocus module which primarily offers an extended low light sensitivity down to EV -3.0 (at ISO 100). In the smaller format camera, the spread of 51 points offers greater scene coverage and the 15 central points – arranged in three columns of five – are cross-type arrays which remain functional with lenses as slow as f5.6. A total of 11 points, including the centre-most cross-type array, work with lenses as slow as f8.0 primarily to accommodate telephotos being used with a teleconverter.

Switching between single-shot and continuous AF operation can be done manually or left to the camera, and there's the choice of using single-point AF or one of three 'Dynamic Area' auto modes – for nine, 21 or all 51 points – to progressively increase the coverage if a subject moves away from the selected focus point. Additionally, there are '3D Tracking' and 'Auto Area' modes for auto AF point selection, but the D7200 doesn't have the 'Group Area' mode found on the latest 'FX' format Nikon D-SLRs. A body-based autofocus motor is retained so non-AF-S Nikkor lenses can be used. In live view and when shooting video, autofocusing is via the contrast-detection method only.

Exposure control is based on the same 2016-pixels '3D Colour Matrix II' system used in the D7100 (and also, incidentally, the D610) so it's not Nikon's top-spec system, but still quite capable. It integrates with the AF system to enable what Nikon calls "Scene Recognition" analysis based on known image patterns in order to improve overall accuracy.

The 'Matrix' multi-zone metering is supplemented by centre-weighted average and spot measurements, the latter on a 3.5 mm diameter circle representing 2.5 percent of the total frame area. It can be set to coincide with the active focusing point. The averaging meter's centre-weighted area – to which is applied a 75:25 bias – can be varied in diameter (6.0 mm, 8.0 mm – the default setting – 10.0 mm or 13.0 mm).

The standard set of 'PASM' exposure control modes is supplement by 16 subject modes. There's the usual complement




Review screen options include (from top) employed focus points, a thumbnail with either RGB histograms or with capture data and a brightness histogram, and full capture data overlays.


**Nikon isn't** holding back when it comes to equipping its D-SLRs for video work so the D7200 carries on from where the D7100 left off. The later-generation 'Expeed 4' processor allows for Full HD resolution recording at 30, 25 or 24 fps with progressive scanning, plus at 60 or 50 fps if you switch to the '1.3x' crop mode. With the 1080/50p recording, the maximum bit rate is 42 Mbps. However, the maximum recording duration is just ten minutes. As before, there's also the option of selecting between High and Normal quality modes which give bit rates of 24 Mbps and 12 Mbps respectively.

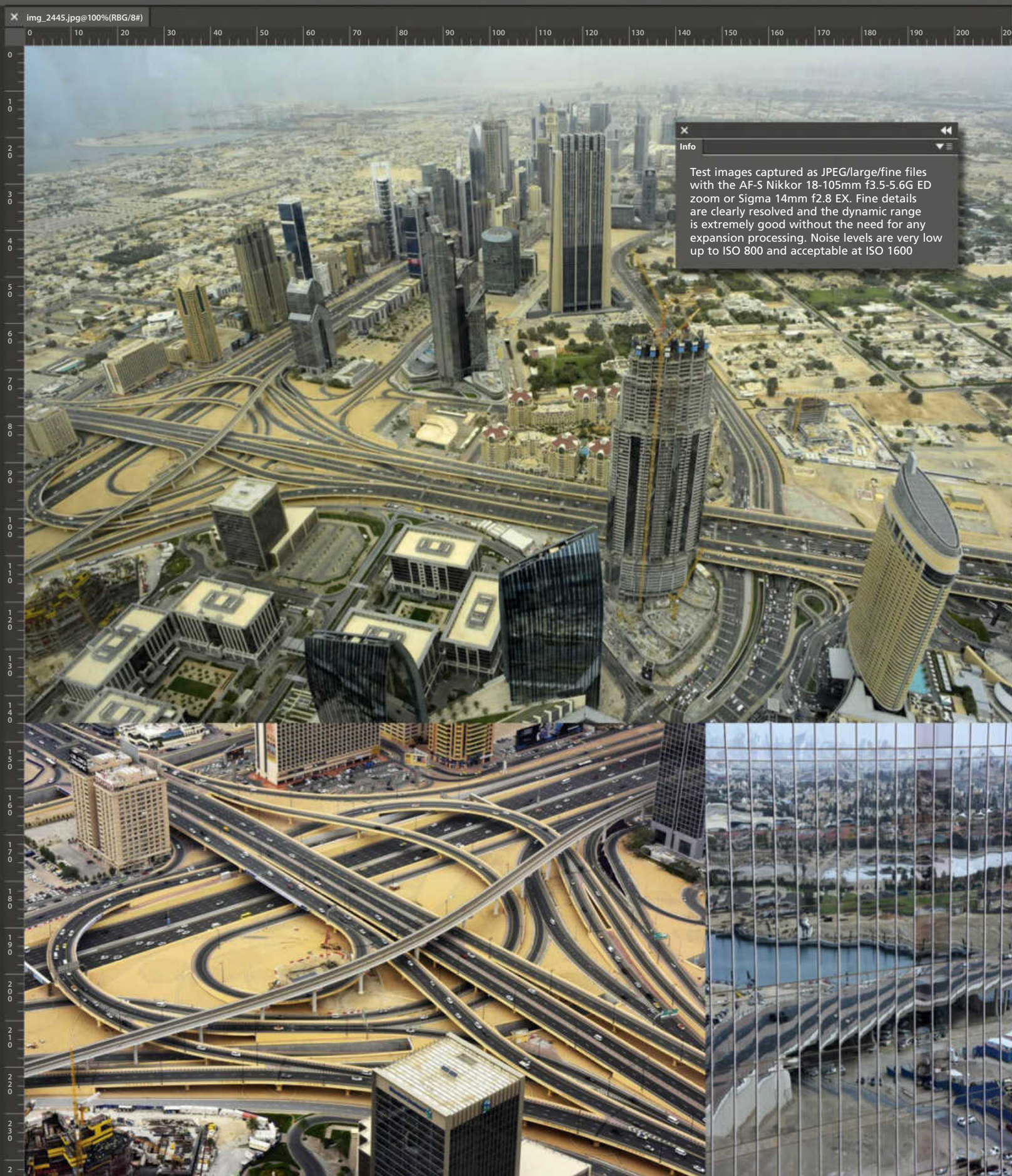

Movie menu has been revised to reflect the D7200's increased video-shooting capabilities.

As is common across the range, the D7200 records in the MOV format using MPEG-4 AVC/H.264 compression, but a 'clean' and uncompressed FHD video feed (8-bit, 4:2:2: colour) is available from the HDMI connector.

Stereo microphones are built-in and the camera has both a stereo audio input and a stereo output for connecting headphones. The D7200 also has the additional audio controls found on models such as the D750 and D810, namely levels adjustment over 20 steps, 'Wide' and 'Vocal' frequency response settings and a switchable low-cut (or wind) filter. In movie mode, the 'i' button provides direct access to all these audio adjustments, as well as the image quality settings and frame rates, and the 'Picture Control' presets. Also selectable from here is a zebra pattern generator which is a less intrusive method of showing where the blown-out lights are when shooting video.

Continuous autofocusing is available during video recording, but the exposure must be preset and the only adjustment available is exposure compensation. However, the D7200 does allow for auto ISO control with the manual exposure mode so a desired aperture can be maintained in changing light levels. Unfortunately, though, this model doesn't have the very handy 'Power Aperture' control that's provided on the likes of the D750 and D810.

You probably aren't going to rush out and buy the D7200 specifically as a video camera, but if you want to shoot video with your D-SLR, it's pretty well got everything you're likely to want and does a good job into the bargain.


img_2445.jpg@100%(RBG/8#)
Info
Test images captured as JPEG/large/fine files with the AF-S Nikkor 18-105mm f3.5-5.6G ED zoom or Sigma 14mm f2.8 EX. Fine details are clearly resolved and the dynamic range is extremely good without the need for any expansion processing. Noise levels are very low up to ISO 800 and acceptable at ISO 1600
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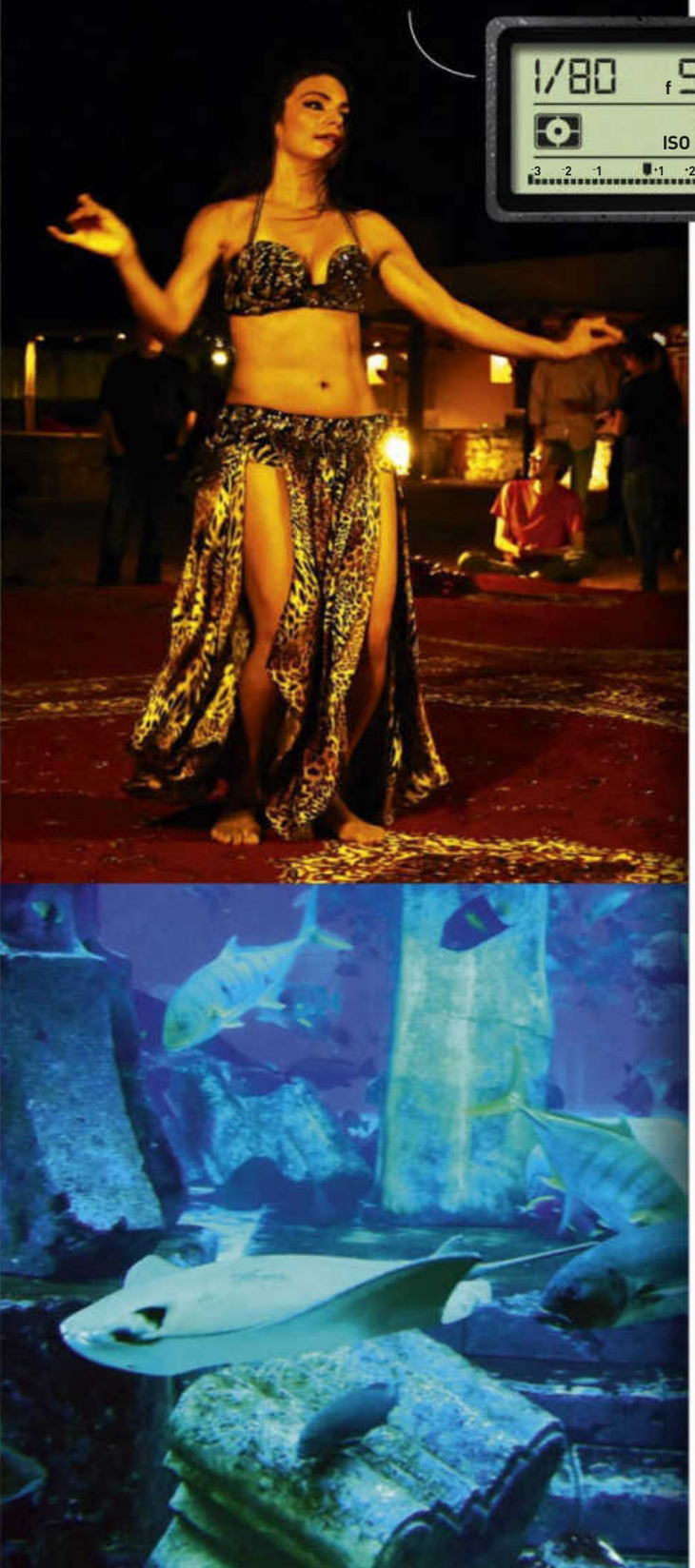



This image was captured at ISO 3200 with the camera hand-held. There's some softening of details, but otherwise colour (chroma) noise is very well suppressed. The exposure was 1/80 second at f5.0 with +0.7 EV compensation and using the Vivid 'Picture Control' preset. The AF functioned reliably despite the very low light levels.

of facilities for fine-tuning exposures, including program shift, auto bracketing, an AE lock and up to +/-5.0 EV of compensation applied in one-third, one-half or full stop increments. The exposure bracketing sequences can be up to nine frames with adjustments in one-third, two-thirds, one, two or three stop increments (but with the last two, the maximum sequence is five frames).

Usefully, the exposure bracketing can be combined with flash bracketing. The shutter has a speed range of 30-1/8000 second (with flash sync up to 1/1250 second) and is tested to 150,000 cycles.

## LIGHT AND WHITE

The D7200's built-in flash has a metric guide number of 12 (at ISO 100) and it uses Nikon's i-TTL control system, based on the 2016-pixels metering sensor and emitting a series of nearly-imperceptible preflashes to determine the exposure, including balanced fill-in. The other modes include red-eye reduction, slow speed sync and the option of switching to second curtain sync. In addition to the bracketing function, flash compensation can be set over a range of -3.0 to +1.0 EV and there's also a flash output lock. In manual mode, the power output can be wound down to 1/128. As is now pretty well standard across the Nikon D-SLR line-up (except, obviously, for the D4S), the built-in flash can serve as the commander unit for a wireless TTL flash set-up.

White balance control also relies on the 2016-pixels RGB metering sensor. The standard automatic correction has a range of 3500 to 8000 degrees Kelvin, but there's the option of a 'Keep warm lighting colours' or 'Auto 2' setting which is designed to maintain warmers tones when shooting under incandescent lighting. There are 12 presets, including seven for the various different types of gas-ignition lamps ranging from sodium-vapour at 2700 degrees Kelvin to mercury-vapour at 7200 degrees Kelvin.

Fine-tuning of all the presets is possible in five-mired increments across the green-to-magenta and blue-to-amber colour ranges. Alternatively, the colour temperature can be set manually from 2500 to 10,000 degrees Kelvin with the option of adjustments in extremely fine ten-degree increments or in mireds (separately for the green-to-magenta and blue-to-amber colour ranges). White balance bracketing can be in one-, five- or ten-mired increments and over two, three, five, seven or nine frames. A total of six custom white balance measurements can be measured and stored for future recall.


As on all Nikon D-SLRs, the menu system is very logically arranged and easy to navigate.


New Flat 'Picture Control' preset (bottom) is designed to optimise the dynamic range when shooting video or for JPEG capture.


Live view screen displays include a grid guide (top) and a level indicator, but a real-time histogram is only available when shooting video.

## ON THE MENU

The D7200 also sticks to the standard Nikon script in terms of its menu system and display options. As always, the menus are well organised and easy to navigate via a series of progressive 'right clicks' which takes

you from the chapter tabs through to actual settings. The Custom Setting Menu remains the best in the business, logically organised into sections relating to particular areas of operation… i.e. Autofocus, Metering/Exposure, Timers/AE Lock, Shooting/Display and so on. You simply can't go wrong and everything is where you'd expect it to be.

We've already mentioned the viewfinder displays which include dual-axis level indicators which are also available in the live view screen, except in the form of a much more elaborate multi-colour 'Virtual Horizon' graphic. The LV screen can also be configured with a guide grid, but there isn't the option of having a real-time histogram here, although curiously this is available in the movie mode. Pressing the 'i' button brings up a selection of functions which can be directly accessed for adjustment, including the 'Picture Control' presets, image quality settings and the 'Active D-Lighting' correction.

As usual on a Nikon D-SLR, the image review screens can be expanded – via a checklist in the Playback Menu – to cycle through a variety of displays, including a thumbnail with a full set of brightness and RGB histograms, an image overlaid with the focus point(s) employed, and three pages of image data which increases if copyright details are included and/or the optional GPS receiver is fitted. The highlight warning can be cycled through the RGB channels separately. The playback options include 4/9/72 thumbnail displays, zooming up to 38x and a slide show with variable image display times.

As noted earlier, the camera's Retouch Menu includes a variety of special effects and, again, can be quickly accessed via the 'i' button. Also here is 'D-Lighting' correction for post-capture dynamic range expansion, conversion to B&W (with the additional choices of either sepia or cyanotype toning), distortion control (with auto or manual correction), and RAW-to-JPEG conversion. There's also a 'Quick Retouch' setting which automatically boosts the saturation and contrast according to the selection of 'Low', 'Normal' and 'High' settings.



**ON THE FACE OF IT, THE D7200 DOESN'T LOOK LIKE MUCH OF AN UPGRADE OVER THE D7100, BUT DELVE A BIT DEEPER AND IT'S EVIDENT THAT QUITE A LOT HAS CHANGED.**

The WiFi module offers the convenience of NFC 'touch and go' connectivity for Android devices… the location of the antenna is indicated by a small NFC logo on the handgrip. Nikon's Wireless Mobile Utility app then allows for image browsing and uploading, but is fairly limited in the way of remote camera controllability.

## SPEED AND PERFORMANCE

With our Lexar Professional 64 GB SDXC 600x reference memory card loaded, the D7200 captured a sequence of 34 JPEG/large/fine frames in 5.515 seconds which represents a shooting speed of 6.16 fps. This is slightly better than the quoted maximum speed and, additionally, the test files were around 18.7 MB in size while Nikon bases its figures on an average of just 12.7 MB.

The D7100's autofocusing was already fast and reliable and that obviously hasn't changed with the D7200, but there's a discernible improvement in the low light performance – especially in terms of responsiveness – and assisted

by the exceptionally wide coverage of fully functioning points.

Although, it's the earlier-spec '3D Colour Matrix II' metering, it's still exceptionally reliable in most situations, including when there's a wide contrast range within the frame.

There's plenty of competition in this class of sensor size and price, including both D-SLRs and CSCs, but Nikon is clearly determined to stay at the top with with its 'APS-C' flagship. The best-quality JPEGs exhibit plenty of crisply-defined detailing and beautifully smooth tonal gradations. Minus an OPLF, the sensor delivers an unadulterated 24.2 MP so the reproduction of really fine textures is handled with consummate ease.

The colour fidelity is excellent across the spectrum with good neutrality when using the Standard 'Picture Control' preset, but if you like a bit of extra 'punch' it's hard to go past the Vivid preset which delivers some extra saturation and contrast, but doesn't overdo it.

In terms of noise levels, the D7200 performs extremely well up to ISO 800 and even at ISO 1600 and 3200 the image quality is still good, although the latter exhibits some reduction in both sharpness and saturation. The ISO 6400 setting is usable too, but things start to look progressively more ragged at ISO 12,800 and 25,600 so it's not surprising that the two expansion settings are for B&W capture only.

Particularly notable is the D7200's wider dynamic range (discernibly improved over the D7100) which can be better exploited with the new Flat 'Picture Control' preset. Using the ADL processing further increases the tonality into the brighter highlights without compromising the deeper shadows.

## THE VERDICT

On the face of it, the D7200 doesn't look like very much of an upgrade over the D7100, but delve a bit deeper and it's evident that quite a lot has changed, both for still photography and for shooting video.

Given the D7100 was – and still is – a very competent and capable camera, the D7200 goes further, making it a very desirable package indeed… just as well given the actual competition is much stiffer now, especially from the mirrorless designs.

As we've noted with most of Nikon's recent D-SLRs, the D7200 is determinedly 'old school' in terms of its design and operation which is becoming an increasingly marked point-of-difference with its mirrorless rivals sporting features such as touch screens and pixel shifting. However, while maintaining its clear appeal to D-SLR traditionalists, Nikon has kept the D7200 well in the hunt with its increased video functionality, WiFi connectivity and a myriad of little tweaks to various features and their settings to expand its overall capabilities. Consequently, the D7100 now really has more in common with the likes of the 'FX' format D610 than any of its 'DX' siblings which is good news for anybody with a system of the smaller format lenses.

Just how long Nikon can keep its 'business as usual' approach to new D-SLR designs is debatable, but right now the D7200 ticks a lot of boxes.

## VITAL STATISTICS

## NIKON D7200 $1449

body only, estimated average street price

Type: Enthusiast-level digital SLR with Nikon F (D-type) bayonet lens mount
Focusing: Automatic via 51-point wide-area system using phase-detection type CCD sensor with 15 cross-type arrays. Focus points may be selected manually or automatically and either as single points or in groups (9/21/51). Points re-orientated for vertical shooting. One-shot and continuous modes both with a predictive function. 3D Tracking mode. Sensitivity range is EV -3 - 19 (ISO 100). AF assist provided by built-in illuminator. AF micro-adjustment for individual lenses (up to 20). Contrast-detection AF in live view and video modes.
Metering: 2016 pixels RGB '3D Color Matrix II', centre-weighted average (with variable diameter weighting – 6.0mm, 10mm or 13mm), spot (3.5mm/2.5%), highlight-weighted, and i-TTL flash via 2016-pixels sensor. Metering ranges are; 3D Color Matrix and C/W average = EV 0 to 20; spot = EV 2 to 20 (f1.4/ISO 100).
Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, i-TTL auto flash and manual flash. 16 subject/scene modes.
Shutter: Electronically-controlled, vertical travel, focal plane type, 30-1/8000 second plus 'B'. Flash sync up to 1/250 second. Exposure compensation up to +/-5.0 EV in 1/3 or ½ stop increments.
Viewfinder: Coverage = 100% vertical/horizontal. Magnification = 0.94x (50mm lens at infinity). OLED displays and LED focus point indicators. Standard focusing screen has AF zones and on-demand grid lines. Eyepiece strength adjustment provided.
Flash: Built-in pop-up unit with GN 12 power (ISO 100). Auto, fill-in, red-eye reduction, front/rear sync and slow speed sync modes. Commander mode for wireless TTL control of compatible external flash units. External flash units connect via hotshoe. Flash compensation range of -3.0 to +1.0 EV in 1/3 or ½ stop increments and flash bracketing (up to three frames). Manual control down to 1/128 of full power.
Additional Features: Magnesium alloy and polycarbonate bodyshell sealed against dust and moisture, auto exposure bracketing (over two, three, five, seven or nine frames) AE+flash bracketing, depth-of-field preview, AE lock, exposure adjustments in either 1/3 or ½ stop increments, variable delay and multi-shot self-timer (two to 20 seconds, up to nine frames, 0.5-3.0 seconds intervals), mirror lock-up, quiet shutter mode, audible signals, wired remote control terminal, wireless remote control, 53 custom functions.

DIGITAL SECTION

Sensor: 24.72 million pixels CMOS with 23.5x15.6 mm area. Sensitivity equivalent to ISO 100-25,600 (extendable to ISO 51,200 and 102,400, but for B&W capture only). No optical low-pass filter (OLPF).
Focal Length Increase: 1.5x.
Formats/Resolution: Three JPEG compression settings (1:4, 1:8 and 1:16), and lossless compressed, compressed or uncompressed RAW files. Three resolution settings at 3:2 aspect ratio; 6000x4000, 4496x3000 and 2992x2000 pixels. Three resolution settings in '1.3x' format (18x12 mm); 4800x3200, 3600x2400 and 2400x1600 pixels. Additionally, still images can be captured in the movie mode in the 'DX' and '1.3x' formats and the 16:9 aspect ratio, again at three resolution settings. RAW (NEF) images are captured at 6000x4000 pixels, in either 36-bit or 42-bit RGB colour, and either lossless compressed or compressed. RAW+JPEG capture is possible (with all JPEG compression levels).
Video Recording: Full HD = 1920x1080 pixels at 50, 25 or 24 fps (PAL, progressive) and 16:9 aspect ratio. HD = 1280x720 pixels at 50 fps (PAL, progressive) and 16:9 aspect ratio. MPEG 4 AVC/H .264 compression. Stereo sound recording with auto/manual adjustable levels. Stereo microphone input and headphone output provided. Clip duration limited to 20 minutes at normal quality (1080/50p, 24 Mbps), up to 10 minutes at high quality (1080/50p, 42 Mbps). File size limit is 4.0 GB.
Video Features: Index marking, zebra pattern, time lapse recording, auto flicker detection, uncompressed 8-bit RAW data output via HDMI connection (with simultaneous recording to a memory card).
Recording Media: Two slots for SD/SDHC/SDXC (UHS-I compliant) memory cards. Overflow, Backup and RAW Primary-JPEG Secondary file management modes.
Continuous Shooting: Up to 100 frames at 6.0 fps in JPEG/large/fine mode, up to 18 frames in RAW mode (14-bit, lossless compressed). Low speed continuous shooting mode can be set from 1.0 to 6.0 fps. Continuous shooting at 7.0 fps in '1.3x' mode.
White Balance: TTL measurements using the 2016-pixels RGB metering sensor. Auto/manual control with 12 presets and six custom settings. White balance fine-tuning available for AWB and all presets plus manual colour temperature setting (2500-10,000 degrees Kelvin) and white balance bracketing (up to three frames). Warm AWB setting maintains a warmer hue under incandescent lighting.
Interfaces: USB 2.0, HDMI output (Type C), 3.5mm stereo audio input, 3.5mm stereo audio output, accessory terminal.
Additional Digital Features: Active sensor cleaning, dual-axis 'virtual horizon' display, live view functions (with contrast-detection AF), 8.1 cm LCD monitor (1.299 megadots resolution), 'Active D-Lighting' contrast control (Auto, Low, Normal, High, Extra High), ADL bracketing (up to five frames), seven 'Picture Control' presets (Standard, Neutral, Vivid, Monochrome, Portrait, Landscape, Flat), adjustable 'Picture Control' parameters (Sharpening, Clarity, Contrast, Brightness, Saturation, Hue), B&W filters and toning effects, nine user-defined 'Picture Control' modes, seven at-capture special effects (Night Vision, Colour Sketch, Miniature, Selective Colour, Silhouette, High Key, Low Key), multiple exposure facility (up to three frames with Auto Gain), intervalometer (with exposure smoothing), HDR dual-shot capture (Auto, Extra High, High, Normal, Low), sRGB and Adobe RGB colour spaces, long exposure noise reduction (Off, On), high ISO noise reduction (Off, Low, Normal, High), auto ISO with auto minimum shutter speed control, lens distortion correction (Off, On), lens vignetting correction (Off, Low, Normal, High), real-time histogram (in live view), image comments input (up to 36 characters), auto image orientation, adjustable image display time, slide show, brightness and RGB histograms, highlight alert, 4/9/72 thumbnail displays, calendar thumbnail display, playback zoom (up to 38x in 'DX' format), 'Retouch Menu' for in-camera editing (D-Lighting, Red-Eye Correction, Trim, Monochrome, Filter Effects, Colour Balance, Image Overlay, RAW Processing, Resize, Quick Retouch, Straighten, Distortion Control, Fish-Eye, Colour Outline, Colour Sketch, Perspective Control, Miniature Effect, Selective Colour, Edit Movie, Side-By-Side Comparison), built-in WiFi with NFC connectivity. May be fitted with optional GP-1 or GP-1A GPS receivers. PictBridge and DPOF support.
Power: One 7.0 volt, 1900 mAh rechargeable lithium-ion battery pack (EN-EL15 type). Optional MB-D15 battery grip accepts one EN-EL15 li-ion pack or six AA-size batteries (alkaline, NiMH or lithium).
Dimensions (WxHxD): Body only = 135.5x106.5x76.0 mm.
Weight: Body only = 675 grams (without battery pack or memory card).
Price: Body only = $1449, estimated average street price.
Distributor: Nikon Australia Pty Ltd, telephone 1300 366 499 or please visit www.mynikonlife.com.au

# SHOOTING FOR THE STARS!

## ASTROPHOTOGRAPHY WITH OLYMPUS'S NEW SUPER FAST FISH-EYE LENS


## THE HIGHLIGHTS

### M.ZUIKO DIGITAL ED 8mm f1.8 PRO

- 16mm fish-eye (35mm format equivalent)
- World's fastest aperture of f1.8
- 17 elements (in 15 groups) optical construction which fully minimises comatic and chromatic aberrations
- Special elements optimise image quality, including high sharpness across the entire image field
- Olympus's 'ZERO' high-performance multi-coating to effectively reduce ghosting and flare
- A minimum focusing distance of just 2.5 centimetres
- Weather-proofed construction, including against sub-zero temperatures (down to -10 degrees Celsius)

**THE NEW M.ZUIKO** Digital ED 8mm f1.8 PRO is the world's fastest fish-eye with a 180 degrees angle-of-view so it's a whole lot more versatile than you might expect. We've sampled its expansive capabilities for astrophotography. If you think a fish-eye lens is just a bit too specialised, Olympus may just change your mind with its new 8mm f1.8 model. It's the latest addition to the PRO series of pro-grade lenses for the OM-D cameras (although it'll also fit any Digital Pen camera body as well), and it combines a remarkable 180 degrees angle-of-view with a fast maximum aperture of f1.8. In fact, right now, it's the world's fastest 180-degree fish-eye.

The ultra-wide angle-of-view is obviously ideal for astrophotography, enabling you to capture the full impact of an expansive night sky. The effective focal length is 16mm so this lens has an inherently large depth-of-field, ensuring any objects in the foreground of your image will be sharp as well as the sky. However, what's really important for astrophotography is that this focal length allows for much longer exposure times (up to 30 seconds, in fact) without the stars moving and starting to create light trails. In other words, even with fairly long exposure times, the stars remain spherical and perfect pinpoints of light.

Not surprisingly, this places considerable demands on the quality of the optics and Olympus has gone to great lengths to come up with a design that optimises both sharpness and brightness across the frame – quite a challenge with a 180-degree angle-of-view – but also minimises comatic and chromatic aberrations.

## THE INSIDE STORY

The M.Zuiko Digital 8mm PRO lens is packed with state-of-art optical technologies… the 17-element construction includes Super ED (extra-low dispersion), Super HR (high refractive index) and aspherical types which combine to provide uniform centre-to-corner sharpness and negligible vignetting.

Additionally, this lens has Olympus's ZERO (Zuiko Extra-low Reflection Optical) multi-coating to effectively counter both ghosting and flare. Thanks to its exceptional optical performance, this is a fish-eye lens with a great many more applications than would normally be the case… including, for example, underwater photography (where the expansive angle-of-view again creates visual impact and the wide aperture allows for faster shutter speeds) and landscape photography for truly 'big' views. An optional underwater lens port is available for using this lens on OM-D camera bodies. A minimum focusing distance of just 2.5 centimetres means that you can even use this lens for some spectacular macro photography, using the exaggerated perspective for dramatic effect.

Olympus has even thought about the environments in which this lens is likely to be used, so its design is fully weatherproofed to prevent the intrusion of dust or moisture while also enabling you to keep on shooting in temperatures as low as -10 degrees Celsius (with either the OM-D E-M1 or E-M5 Mark II). This sealing means condensation forming inside the lens just isn't an issue when shooting on a cold night.

Compared to many other fish-eye lenses too, the Olympus 8mm f1.8 PRO is very compact, measuring just in 80 millimetres length (including its built-in hood) and weighing only 315 grams… so you don't need a super heavyweight tripod when taking longer exposures at night. And, of course, the fast aperture of f1.8 means you can leave the tripod at home on more occasions, especially with the sophisticated five-axis image stabilisation that's available in both the E-M1 and E-M5 II.

A unique combination of useful capabilities and high optical performance makes the M.Zuiko Digital ED 8mm f1.8 PRO a remarkable lens which has the potential to open up a whole new world of photography, bringing a dramatically different perspective to a variety of applications.

REPORT BY TREVERN DAWES

# EPSON
## SURECOLOR SC-P600


# SURE THING

**Epson kicks off a new generation of pigmented-ink photo printers under the "SureColor" brand. Trevern Dawes puts the A3+ model through its paces.**

While new digital cameras arrive at a rapid rate, it can be several years between an A3+ printer and its updated model. After four years, the Epson SureColor SC-P600 is the successor to the venerable Stylus Pro R3000.

The new SC-P600 (the "P", by the way, stands for "Photo") is essentially the same as the out-going Stylus Pro R3000, but comes in a revised casing and has a new inkset, extended connections to remote devices and a 6.8 cm LCD tilt-adjustable touch screen to control most functions. As a 'prosumer' printer, it is the entry-level A3+ pigment model in the SureColor range which is progressively going to replace the Stylus Pro models. However, the word "entry" could be an

inappropriate classification as this printer is by no means basic.

We might concede that inkjet printers have reached a plateau of image realism where little else can be achieved apart from the usual consumer wish list of cheaper prices for both printer and inks combined with faster speed and larger capacity cartridges. However, any improvements are undoubtedly welcome.

The new UltraChrome HD pigment inkset (coded as a T7601 to T7609) comprises five colours (Cyan, Light Cyan, Yellow, Vivid Magenta and Vivid Light Magenta) and four blacks (Photo Black, Matte Black, Light Black and Light Black). The Photo Black and Matte Black share a channel and automatically interchange according to whatever media is selected to have eight inks running.

The D-Max of 2.84 is claimed by Epson to be the darkest for any pigment printer. In association with the new colourants, new resin encapsulation and high resolution, the print quality with pigments reaches a new peak. For extra measure, the longevity ratings are expected to significantly increase but we'll need to await confirmation from Wilhelm Research.

**IF THE SC-P600 DOES A CREDITABLE JOB WITH GLOSS AND SEMI-GLOSS MEDIA, IT'S AT ITS VERY BEST WITH MATTE AND FINE-ART PAPERS. THE DEPTH OF THE BLACK HELPS TO ANCHOR THE COLOURS.**

The connections with Apple AirPrint and Google Cloud Print plus WiFi Direct (for smartphones, tablets and PCs) will appeal to the technically minded, but is likely to have little bearing when it comes down to making exhibition quality display prints.

## DESCRIPTION

The sleek, black SureColor SC-P600 has a sturdy construction and is as elegant as a desktop printer can be. Weighing 15 kilograms, it's easy enough to position on a sturdy desk and comfortable enough to carry over short distances. The top area is ideal for temporary placement of papers.

The LCD touch screen swivels out to 45 degrees. The top left button is a blank while the other three are for power on/off, back to previous menu, and home. The LCD menu attends to most functions, including media selection, WiFi connection, CD/DVD label printing, black ink selection and a low ink warning. Via 'Administration' and 'Print Status Sheet' there is even a usage history to report on the date of first usage, the number of prints and the A4 equivalent prints.

The default for sleep mode is three minutes. If no operation occurs during that period the printer goes to sleep but is awakened by any new action. The duration can be altered from one to 240 seconds via the LCD menu. Power supply may be set to 'Off' to leave the printer on continually or to a designated time.

Three paper feed systems are available, along with a CD/DVD tray. The auto sheet feeder attends to most printing operations, the front loader is designed for fine-art media up to 1.3 millimetres in thickness and heavyweight media, while a roll feeder can be attached at the rear.

General operation is relatively quiet apart from an occasional whir as the printer sorts out its routines. From time to time the printer will stop to have a 'big think', sometimes for a minute or so, to check everything and will then carry on.

## IN THE BOX

The sturdy packing box contains the printer, 'Getting Started' instructions, a software disc, the set of ink cartridges, the CD/DVD printing tray, roll paper supports, a 1.8-metre USB cable and a power cable.

Everything is well presented including the cartridges being in the right order to match positions in the printer. The accessory box should actually be retained to store the transport lock, CD and spare cartridges.

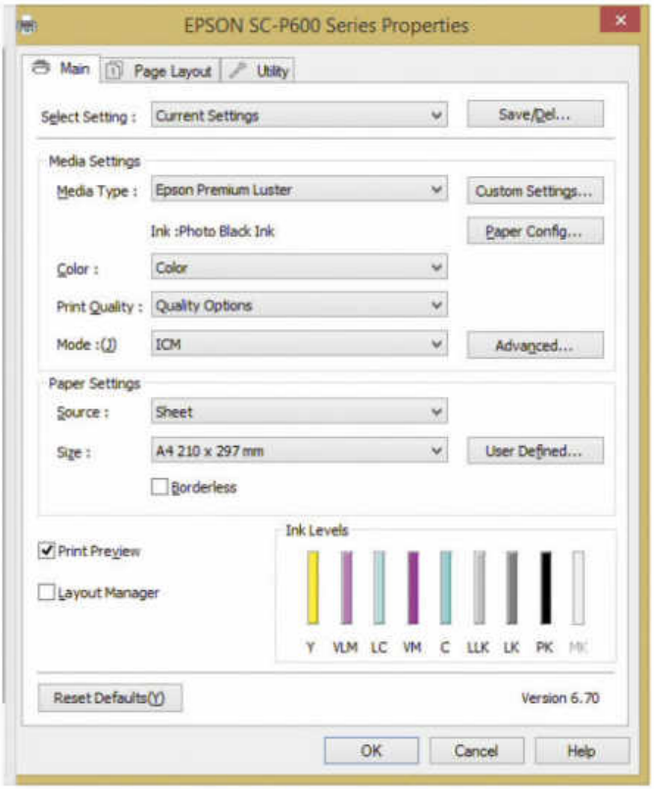
A 125-page PDF manual may be downloaded from the Epson Website. Take the trouble to read the manual to become familiar with all the features. Alas, the days of a hardcopy manual to accompany a printer may have disappeared forever.

It takes about 40 minutes to remove the printer from the box, remove all the protective tape and the plastic orange transport lock, insert the ink cartridges and load the software. The transport lock should be retained and re-inserted

The angled control panel/screen provides useful information and access to the printer's features.


The nine-pigment ink cartridges. Each cartridge contains 25.9 millilitres of ink.

The Epson Print CD program allows CD/DVD labels and jackets to be produced.




The 'Main' panel is where all the parameters are established. Regular settings can be saved for quick retrieval.

and taped securely if the printer is to be moved.

The step-by-step set-up procedure is easy to follow and begins by turning the printer on. After pressing to confirm 'English' is the default language (overlook this critical step and the inks will not charge) the cartridge compartment is opened. Each cartridge is given a gentle shake and yellow tape removed from ink outlets before insertion into the dedicated position. When the lid is closed, the printer will take about ten minutes of whirring and general noise to charge the print head. In this initial priming, a small amount of ink is used to run ink through the lines. The screen will then advise to connect the USB cable and install the software.

Upon completion, the default will be for the Photo Black ink. Consequently, to avoid any ink loss immediately by a changeover, it's a good idea to start out with gloss or semi-gloss media.

## PAPER HANDLING

The auto sheet mechanism takes hold of the paper, pushes it up and down to set the alignment and then proceeds. Accurate placement of paper in the auto sheet feeder as single sheets (or as stacked, fanned paper) is important, otherwise the printer may not pick up the paper or will take it straight through, add a dent and announce the failure with some beeps and a 'Reload' message.

The review printer proved to be inconsistent with the auto paper feeder, one day working perfectly and the next day causing frustration. Hopefully, this was just a glitch in this particular printer and not a common problem.

The front feed for fine-art and heavyweight papers requires a tray to be lowered and the rear output support platform opened. Paper is positioned and 'Load' pressed on the touch screen. The paper is drawn through to the rear outlet and, after a short wait, the printer instructs the tray to be returned to its normal position. The print file is then sent. Unlike some other printers, there are no margin restrictions applied.

The paper roll facility is essential for long banners, but for a metre long panorama the auto paper feeder is fine. Epson has ten-metre rolls of glossy (255 gsm) and semi-gloss (251 gsm) paper. Needless to say, it's important to ensure adequate ink supply and preferably run a small test piece before committing. There is no auto paper cutter, but a faint line is printed to enable scissors to be used.

The roll paper facility allows banner prints up to 15 metres long. The 'User Defined' setting allows widths from 89 to 329 millimetres and lengths from 89 to 15,000 millimetres. Curiously, the user manual indicates a maximum roll length of 3276.7 millimetres, but only 1117.6 millimetres for Mac users.

## MAIN PANEL

The 'Main' panel is the hub for printing. 'Media Type' has a listing for five categories with further options. These are 'Photo Paper' (4), 'Matte Paper' (2), 'Fine Art Paper' (3), 'Plain Paper' (1) and 'CD/DVD' (2).

The range of 'Print Quality' is determined by the media type. This list covers 'Speed', 'Quality', 'Max. Quality' and 'Quality Options'. The latter cover resolution and the choice of having 'High Speed' printing set to either 'Off' or 'On'.

The modes of colour management include 'Epson Standard (sRGB)', 'Adobe RGB', 'PhotoEnhance', 'ICM' and 'Off – No Colour Management'. The first two basic settings simply lock into the colour space of the image while 'ICM' follows through to ICC profiles. Although each approach produced satisfactory results, most Photoshop enthusiasts can opt for 'Printer Manages Colours' and lock in ICM values, or 'Let Photoshop Manages Colours' with the 'Mode' set to 'Off – No Colour Adjustment'.

The 'Size' menu lists standard paper sizes and includes a 'User Defined' setting where a custom size can be established and saved. A right-click over any feature will bring up 'Help' and further details.

On the Epson Website there is an excellent RGB guide to colour printing compiled by Australia's Training and Application Specialist. Simply search on "RGB Print Guide – Epson Australia".

## GLOSS AND SEMI-GLOSS

Test prints made on gloss and semi-gloss media had impact and vibrance approaching that of the dye-based printers, but also exhibited gloss differential (i.e. seeing the gloss surface of the paper where no ink resides). This has always been a problem with pigmented inks used on gloss or semi-gloss media. The only remedy is to use printers with a gloss optimiser cartridge, such as the Epson Stylus Pro 2000. The only disadvantage here is a slight dulling down of the surface. Prints made on papers like Epson Traditional Photo or Innova Fibraprint Gloss were substantial in weight and image quality.

Epson does offer a useful piece of advice for reducing the gloss differential on black and white prints. In the 'Main' panel and with 'Advanced B&W' selected, proceed to 'Advanced' and change the 'Off' default for 'Highlight Optical Shift' to 'On'. This adds extra Light Light Black dots to the clear areas.

## MATTE PRINTS

If the SC-P600 does a creditable job with gloss and semi-gloss media, it's at its very best with matte and fine-art papers. The depth of the black helps to anchor the colours.

The first test print was an A4 size B&W made on the Epson Fine Art Velvet paper. As a fine-art paper, this required the use

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of the front feeder. Maximum resolution was set for the B&W print and it took nine minutes and 45 seconds, but the result brought a 'wow' response. The front loader is super fussy about accurate paper alignment so if a repeated 'Askew' message appears, use the LCD screen to proceed to 'Paper Setting' and turn 'Paper Skew Check' to 'Off'.

An A4 colour print – made with the 'Quality' setting – took 2:15 minutes. Epson's Hot Press Bright has been a favourite media and for the A4 test print there was no hesitation in using the utmost resolution. There's no point in settling for compromises when using a top printer and top paper combination. It took another 9:45 minutes, but produced another outstanding result.

Several prints were produced on A3 size Innova Fibraprint 280 gsm matte paper with 300x200 mm images. The profile for Epson UltraSmooth Fine Art Paper was initially adopted. At 'Quality', each print took 2:15 minutes via the front paper feed. The results were a touch yellow, but by using Adobe RGB mode (to match the print files) and taking out -5 Yellow, the colour was then spot on. This proved to be a most satisfactory arrangement without the need to chase down or create a custom ICC profile. A portfolio of prints on A3 could be comfortably produced at about six per hour via the front feed.

The ability to handle other (i.e. non-Epson) media was demonstrated with two A3+ sheets of Lumijet Radiant White 290 gsm (Hahnemühle) fine-art ink jet paper. At 'Quality, level 4' and with the profile for 'Watercolor Paper – Radiant White', it took four minutes with 'High Speed' switched on and nine minutes with 'High Speed' off. The results were most pleasing.

A custom ICC profile might extract a few more points, but getting a good result from a canned profile is most encouraging. The general recommendation is to work with 'High Speed' switched off to ensure better detail and shadow density. Doubling the print time is not an issue when the aim is quality and the print size is A3+.

Ascertaining the differences in print quality between the SC-P600 and Stylus Pro R3000 (or, indeed, any of Canon's pigmented ink printers) using similar images, papers and appropriate ICC profiles without scientific apparatus can be difficult. For those who dwell on the finest of technicalities the Internet can provide precise data for D-Max, gamut, etc. comparisons. The rest of us tend to judge everything by eye.

## B&W PRINTING

Black and white enthusiasts are fully catered for, with the scope for either neutral results or warm, cool or sepia tonings via the Epson Advanced Black and White (ABW) control carried forward from the Stylus R3000. Apart from the gloss or matte black inks, the Light Black and Light Light Black combine to provide extensive tonality.

Devotees of monochrome will undoubtedly experiment to find the optimum settings for favourite papers and may find that assigning RGB mode to print files will deliver better outcomes than printing the same file converted to greyscale.

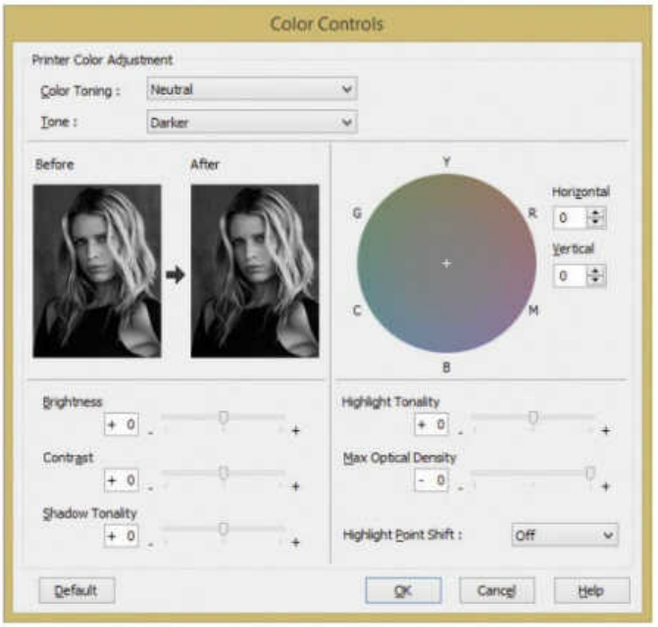
Photo Black and Matte share the same line and interchange automatically. When Photo Black is swapped to Matte Black it takes 1.5 minutes and uses one millilitre of ink, while going from Matte Black to Photo Black takes 3.5 minute and consumes 3.0 millimetres.

However, the 'Normal' default changeover mode can be altered, via the LCD screen, to 'Save' mode for one millilitres spillage each way. The path is 'System Administration', 'Printer Settings' and 'Black Ink Change Settings'.

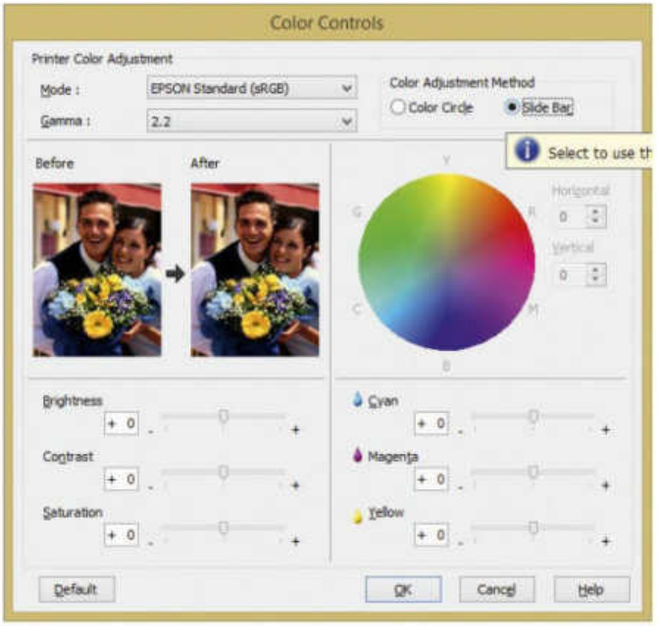
Although there is a small saving in ink, Epson has taken a cautious approach whereby 'Normal' ensures a clean changeover. 'Save' can involve some risk of contamination. Epson at least provides the option. The 'Save Ink' setting is not mentioned in the manual. As regular changeover of black inks will result in wastage of costly ink, printing sessions need to be well organised.

## PANORAMIC PRINTS

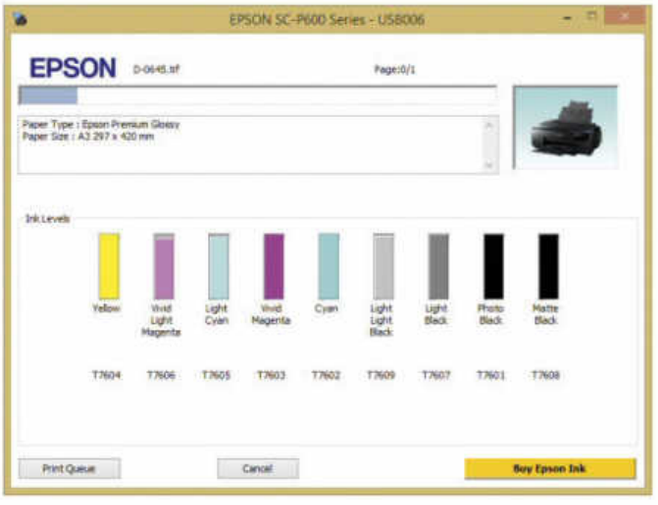
Paper rolls are the ideal way to produce banners or panoramic prints. However, the auto sheet feeder can still be used for long prints provided the paper is properly supported and the leading edge cut square for correct alignment (pull



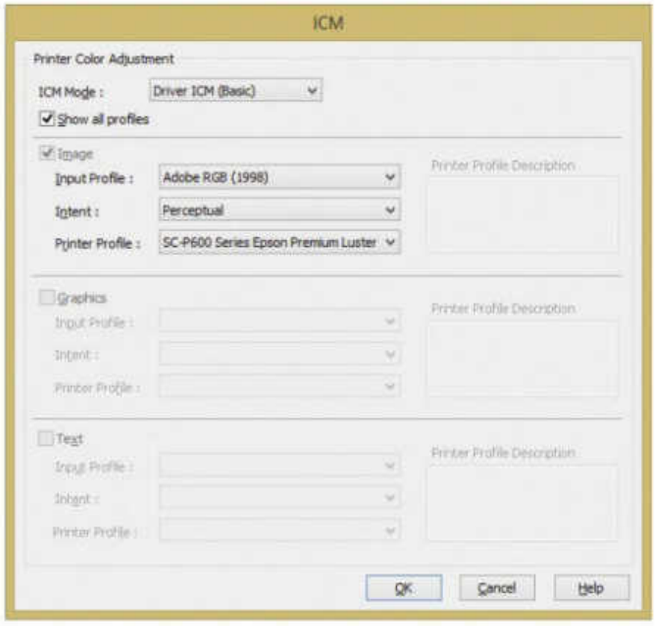

Manual adjustments can be made in the 'Colour Controls' panel.




All ink levels can be monitored, along with print progress and the print queue.




The first warning for low ink provides ample scope for several more prints and time to organise replacement cartridges.



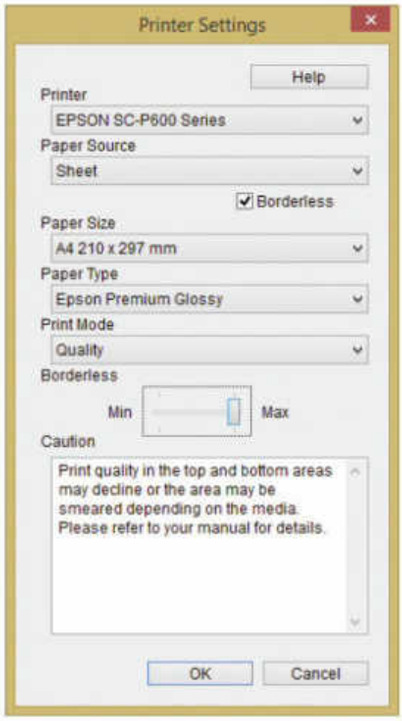

In the 'ICM' panel data for 'Input Profile', 'Intent' and 'Printer Profile' are selected.

The 'Print Preview' is an invaluable feature that should be used all the time.

out the rear paper support only one extension for a wider support). A 1000x30 millimetres image made on a 1200x329 millimetres custom paper size didn't present any difficulties.

The paper was cut from a 610 millimetres wide roll of Schroeller 230 gsm matte and the Epson Archival Matte profile adopted. Maximum resolution and 'High Speed' switched off (no comprises for a big print) may have led to a whopping 36 minutes of printing time, but the result was well worth the wait. Watching the print slowly emerge brought back memories of black and white prints appearing in a darkroom developer tray.

The remainder cut-off piece from the roll – which measured 281x1200 millimetres – was printed by the front feed. This is the better option in ensuring accurate loading on those panoramic prints when paper from the roll holder is not available.




The 'Printer Settings' panel for printing via Epson Easy Photo Print.

Borderless printing is only available at set sizes of A4, A3, A3+, 100x148 millimetres, 9x13 centimetres, 10x15 centimetres, 13x18 centimetres and 20x25 centimetres. The front feed does not support borderless printing.

While an A3 borderless print at the 'Speed' resolution was produced in just three minutes, it took 16:45 minutes at the 'Maximum Quality' setting (i.e. level 5 and with 'High Speed' off). The difference between these two extremes was not immediately noticeable and requires a magnifier to appreciate the variation. The colour in both prints was identical, but the 'Speed' setting did create some banding in a clear blue sky.

## INK USAGE

An accurate assessment of the number of prints per ink set and cost per print would require keeping records of the area of prints created over many ink sets. Our calculations were based on one-and-a-half inksets, weighing full, empty and partially-used cartridges to find the total ink consumed and adding up the total area of printing.

Most printing was carried out at the 'Quality' setting. This resulted in a rough ink cost of about $6.30 for an A3 size print and $3.15 for an A4 print. These are based on a cartridge priced at $47.99 ($1.85/millilitre).

When the first low ink warning occurs there still remains plenty of ink to continue the printing. When the second reminder appears another four or five A4 prints are possible before the "Replace Cartridge" message appears. The cartridge to be replaced is noted on the printer's screen and the computer monitor. Considering the high cost of ink, there is no point in changing ink until the final drop has been consumed.

## PROJECT

Apart from producing a number of prints on a variety of papers, one of the best ways to appraise any printer is to see how it handles a typical project. When it comes to D-I-Y book making, dyes have tended to be a better option than pigments because of finer dot structure (for text), deep blacks, strong colours and no problems printing on any paper. The two picolitre ink droplets and the rich blacks of the Epson SC-P600 could well see a change in thinking, especially when the longer life of pigments is taken into account.

**THE NEW ULTRACHROME HD INKSET DELIVERED EXCELLENT COLOUR AND THE TEXT WAS CRISP AND SHARP ON A NON-TEXTURED SURFACE. AS A BOOK MAKER ON MATTE PAPER THE SC-P600 IS A DREAM.**


The project involved making a book on Schroeller 170 gsm two-sided matte paper using A3+ sheets cut in half to give a size of 329x240 millimetres. Achieving accurate image colour is just one aspect while the sharpness and clarity of text, captions and page numbers is equally important. Twenty sheets at a time were placed in the paper stacker and Indesign commanded to run the pages.

There was no need to prepare a custom ICC profile as Epson's Archival Matte 'canned' profile proved to be an ideal match for the Schroeller paper. The 'Quality' resolution of 1440x1440 pixels was adopted (the 'Speed' setting cannot be used with some papers).

The new UltraChrome HD inkset delivered excellent colour and the text was crisp and sharp on a non-textured surface. As a book maker on matte paper the SC-P600 is a dream.

## TEMPTATIONS

Comparison with Canon printers (the PIXMA Pro-1, in particular) on the basis of initial outlay, running costs, intended usage and features are inevitable and then there are other considerations within the Epson range too.

Each model – in this case the SC-P600 replacing the R3000 – sees the price of the previous model fall. This can be enticing especially if the new features of the P600 are not deemed critical.

Stepping up a notch to the R3880 (or the SureColor SC-P800 model to be released soon) means more outlay dollars for bigger prints, bigger cartridges and significantly reduced running costs. Decisions, decisions, decisions. And now here is the SC-P600 as a top performer with the latest in technology. How wonderful to have such options with such great printers.

## THE VERDICT

Despite a moderate outlay for the printer, relatively expensive inks and a black ink changeover system that still needs attention, the SureColor SC-P600 certainly knows how to turn out a top quality print. The 25.9 millilitres ink cartridges do mean longer usage before changeover, but this still doesn't negate the relatively high cost of the ink.

The SC-P600 is at its very best on matte or fine-art papers. No surface problems, rich blacks to create a foundation for excellent colour, shadow details retained and very simple approaches to matching up everything to images on screen. Longer printing times are not an inconvenience when quality is actually the principal objective.

This printer should not be regarded as a general purpose 'odd job' model, but a 'state-of-the-art' machine for the very best work at moderate volumes. The CD/DVD label printing capacity, roll paper holder and remote printing capacity are nice features, but not likely to weigh heavily against the prime purpose of sheer quality printing.

The SC-P600 is the first of the "SureColor" branded printers from Epson and it's a great start… plus a good cause to be looking forward to the other models coming in the series.

## VITAL STATISTICS

### EPSON SURECOLOR SC-P600 $1499

Printer Type: A3+ format (13 inches wide) for photo-quality prints via a nine-colour pigmented inkset (but eight cartridges in use at any one time with auto switching between matte black and photo black).
Maximum Resolution: 5760x1440 dpi.
Ink Cartridges: Individual per colour, 25.9 millilitre capacity. Epson UltraChrome HD pigments. Colours are photo black, matte black, cyan, light cyan, vivid magenta, vivid light magenta, yellow, light black and light light black. Smallest droplet size is 2.0 picolitres via 'Variable Droplet Technology'.
Paper Sizes: Borderless printing on cut sheets from 149x100 mm up to A3+. Paper rolls up to 329 mm in width can be fitted. Customisable print sizes.
Interfaces: Hi-Speed USB 2.0, 100 Base-T Ethernet, WiFi. Epson iPrint Mobile App., Apple Airprint and Google Cloud Print.
Acoustic Noise: 48.2 dB (A).
Main Features: 6.85 cm LCD display panel with touch controls, Micro Piezo on-demand print head with 180 nozzles per colour, variable droplet sizing, five print quality/speed settings, Advanced B&W mode, auto matte/photo black ink switching (according to media type), head alignment and maintenance sensors.
Dimensions (WxHxD): 616x369x228 mm (closed).
Weight: 15.0 kilograms (without ink cartridges or media).
Price: $1499 (inc. GST). Ink cartridges are $47.99 each.
Distributor: Epson Australia, telephone 1300 131 928 or visit www.epson.com.au

# Big Picture, Big Values

## PENTAX 645Z

Pentax's medium format D-SLR delivers all the imaging performance benefits of a bigger sensor, but is also the most affordable camera in its class... by a long shot.


Pentax 645Z – the most affordable digital medium format camera on the market – and yet also the most capable.

**REGARDLESS OF THE** advances being made with smaller sensors, big is still better when it comes to laying the foundations for superior imaging performance. This means a digital medium format camera system, but this can also mean a price tag that's hard to justify for many photographers.

Pentax's 645Z is not only the most affordable digital medium format camera on the market, it's also the most capable, matching all the features and capabilities of a high-end D-SLR with a full-35mm size sensor. At the heart of the 645Z is a 53 megapixels (total) CMOS sensor with an imaging area of 43.8x32.8 mm. It allows for live view and, for the first time on a digital medium format camera, Full HD video recording. Continuous shooting is possible at up to 3.0 fps for a burst of 30 maximum resolution JPEGs, ten RAW files or 12 TIFFs. Additionally, the 645Z's sensor doesn't have an optical low-pass filter (LPF) in order to maximise resolution. However, in conjunction with an 'SR' image stabilised lens there's a clever 'AA Filter Simulator' feature for on-demand moiré correction. The 645Z offers a wide dynamic range of 14 stops and a sensitivity range equivalent to ISO 100 up to 204,800 which is also class-leading. Dual memory card slots are provided with a variety of file management options, and the 645Z has a magnesium alloy bodyshell which is fully sealed against the intrusion of dust and moisture, and insulated to allow shooting in sub-zero temperatures.

The LCD monitor screen is a large, 8.1 cm display with a 1.036 megadots resolution, and the 645Z has a Keplerian-type telescopic trapezoid prism optical viewfinder which provides 98 percent scene coverage with 0.62x magnification.

A 27-point autofocusing module and metering based on a 86,000-pixel RGB-sensitive sensor give the 645Z the most advanced camera control systems in the digital medium format world. The AF system employs a total of 25 cross-type arrays arranged in a 5x5 pattern, and has a minimum low light sensitivity of -3.0 EV (at ISO 100). The metering system drives 'Real Time Scene Analysis' which works in conjunction with the AF system to determine the most appropriate metering weighting for a given subject or scene.

More accurate white balance control is provided via 'Multi Pattern Auto' measurements using the RGB metering to better deal with scenes which contain a number of different types of lighting. There are also provisions for storing three custom white balance measurements and three manual colour temperature settings.

Other notable features include interchangeable focusing screens, a dual-axis level display, a faster USB 3.0 connection, a set of 11 'Custom Image' picture modes, a multiple exposure facility and multi-shot HDR capture with auto alignment. A large choice of filter effects are available as post-capture editing functions. In-camera lens correction is performed for distortion, diffraction, lateral chromatic aberrations and vignetting.

## POWER POINTS – PENTAX 645Z

- '645' CMOS sensor with 53 megapixels (total) resolution
- No optical low-pass filter (LPF) to optimise resolution
- Sensitivity range equivalent to ISO 100 to 204,800
- Active sensor cleaning
- Maximum continuous shooting speed of 3.0 fps
- 27-point autofocus with sensitivity down to -3.0 EV (ISO 100)
- 86,000 pixels RGB metering with 'Real Time Scene Analysis'
- Tilt-adjustable LCD monitor screen with live view
- Full HD video recording with stereo sound
- Dual SD/SDHC/SDXC card slots with UHS-I speed support
- Weather-sealed magnesium alloy bodyshell
- Operation in down to -10 degrees Celsius
- 11 'Custom Image' picture modes
- 'Multi-Pattern Auto' multi-point white balance measurement



# Star Power

## PENTAX K-3 II

**PENTAX'S UPGRADED** top-of-the-range 'APS-C' sensor D-SLR, the K3 II, not only boasts a high level of features and specifications, but a number of highly innovative new capabilities.

For starters, the sensor-based image stabilisation system has been significantly upgraded and now gives up to 4.5 stops of correction for camera shake. Pentax is also using the enhanced precision of the new IS system to drive a pixel shift function whereby the sensor is fractionally moved as multiple exposures are made. This enables full colour information to be recorded at each pixel location, thereby eliminating colour moiré effects and interpolation artefacts while improving both the sharpness and colour fidelity. To achieve this, the K3 II's 'Pixel Shift Resolution' function records four exposures with the sensor shifted by one pixel up, down, left and right.

The K3 II's image stabilisation system is also used to deliver another interesting new feature in conjunction with its built-in GPS receiver and electronic compass. Along with the camera's orientation sensors, these components drive a feature called 'Autotracer' which is designed for use with astrophotography and shifts the sensor during long exposures so that stars are essentially 'tracked' in-camera. This ensures they're recorded as pinpoints of light and aren't rendered as trails as would normally happen even with comparative short exposures.

The K3 II has a compact and fully weather-sealed magnesium alloy bodyshell over a rugged stainless steel chassis. On the inside there's a 24.7 megapixels CMOS sensor (24.35 MP effective) which works in conjunction with Pentax's 'PRIME III' image processor to deliver, among other things, a maximum continuous shooting speed of 8.3 fps and Full HD video recording at 50, 25 or 24 fps.

The K3 II also boasts a 27-point 'SAFOX 11' high-speed AF module (with 25 cross-type arrays), 86,000 pixels RGB metering sensor and a sensitivity range equivalent to ISO 100-51,200. Dual memory card slots are provided for SD format devices.

As the imaging sensor doesn't have an anti-aliasing (AA) filter in order to optimise its resolution, the camera has an 'AA Filter Simulator' function which corrects for moiré patterns via sub-pixel shifting. The system has three settings – 'Off' which is obviously for prioritising resolution; 'Type 1' which is designed to balance resolution and moiré correction by shifting the sensor in a linear direction; and 'Type 2' which oscillates the sensor in a circular motion in order to optimise the blurring effect and, as a result, moiré correction.

Other useful features include multi-shot HDR capture, a multiple exposure facility, an intervalometer with a 4K video time-lapse movie recording, and a wide choice of 'Digital Filter' effects that are available either for application at-capture or as post-capture editing functions.

The Pentax K3 II is ready for anything.

# Carry On In Style

## ONA BRIXTON

**FOUNDED IN 2010** and based in New York City, ONA bags are designed for (and inspired by) creative professionals, and hand-crafted using premium materials. ONA's design process is driven by a desire to create products that complement your style as well as protecting your valuable camera equipment. In Swahili, the word ona (pronounced o'na) means "to feel," "to believe" and "to experience with the eyes". This is the essence of photography and style.

Made from water-resistant waxed canvas and detailed with full-grain leather, the ONA Brixton is a messenger-style camera bag designed to hold a camera body – D-SLR or CSC – with two or three lenses and up to a 13-inch laptop. As an alternative to the classic canvas, the Brixton is also available in full-grain Italian-tanned leather with a light wax finish that develops a rich patina over time.

On the inside both versions of the Brixton bag feature a padded interior with four removable dividers which make it easy to customise the configuration to suit individual needs. A pocket along the back of the bag offers enough room for a tablet. Two front pockets provide room for lens caps, batteries and small personal items.

The ONA Brixton is designed to be most comfortably worn cross-body.


# Small Wonder

## RICOH GR II

**EVER SINCE IT** introduced the original GR series of 35mm cameras back in 1996, Ricoh has earned a reputation for building high-performance compacts for the enthusiast-level photographer. The latest model, the GR II, continues the tradition. It matches a large 'APS-C' size CMOS sensor with a high-quality 18.3mm f2.8 prime lens which is equivalent to a 28mm wide-angle.

The GR II has a slimline magnesium-alloy bodyshell with a built-in pop-up flash and a 7.62 cm LCD monitor screen with a resolution of 1.23 million dots. The 16.9 megapixels (total) sensor is supported by Ricoh's latest-generation 'GR Engine V' processor which enables continuous shooting at 4.0 fps and Full HD video recording at 25 or 24 fps. Images can be captured as JPEGs in choice of aspect ratios and sizes, or as RAW files in the universal Adobe DNG format. Data is stored on SD format memory cards, and the GR II supports the higher-capacity HC and XC types with UHS-I high-speed data transfer. The lens features a seven-element construction which includes two aspherical types to correct for distortion and one made from high-refraction, lower-dispersion optical glass to minimise chromatic aberrations. A nine-blade diaphragm delivers beautifully smooth out-of-focus effects. The aperture range is f2.8 to f16.

Despite being pocket sized, the Ricoh GR II offers a suite of features similar to that of a D-SLR, including a full set of 'PASM' exposure control modes with the choice of multi-zone, centre-weighted average and spot metering measurements; multi-point autofocusing with face detection and subject tracking; a shutter speed range of 300-1/4000 second, and a wide choice of wide balance control options including a CTE (Colour Temperature Enhancement) mode which emphasise the predominant colour in a scene and Multi-P Auto multi-point measurements for dealing with scenes containing a variety of light sources.

Other useful features include a dual-axis level display, a wide selection of special effects (including HDR Tone, Clarity, Brilliance, Vibrant, Bright and Portrait), a multiple exposure facility, multiple auto bracketing functions (including for white balance, effects, contrast and dynamic range expansion) and built-in WiFi with NFC connectivity.

Ricoh's GR II may be small on the outside, but on the inside it has 'big camera' features, capabilities and specifications.

# Best In Class

## ZEISS PRIME LENSES


Are these the best prime lenses on the planet for D-SLRs or mirrorless cameras with full-35mm size sensors? Glowing reviews and a growing collection of awards say 'yes'.

## ZEISS OTUS

**IF LOOKS ARE** anything to go by, then Zeiss's Otus Series of fast prime lenses are winners even before you mount them on your camera. The three models in the line-up all feature contemporary styling, featuring a manual focusing collar that's fitted completely flush with the barrel and covered with a plain matte rubberised grip material to give a very sleek appearance.

However, they maintain the Zeiss tradition of using heavy-duty metal barrel tubes and all-glass optical constructions. The Otus 28mm f1.4 wide-angle delivers the quality and look of a medium format lens. Its 16-element optical construction employs an advanced retrofocus design to give exceptionally high levels of correction for distortion, both axial and lateral chromatic aberrations and spherical aberrations. Additionally, it delivers exceptional uniformity of centre-to-edge sharpness.

The Otus 50mm f1.4 has 12 elements in ten groups, and it's the first time that the Distagon-type design has been used in the optical construction of a standard lens.

The Otus 85mm f1.4 has 11 elements in nine groups in an Apo Planar design which has been so highly corrected that, to quote Zeiss, it "completely eliminates almost all possible forms of aberration". This optical construction includes no fewer than six elements made from optical glass with anomalous partial dispersion characteristics, and one with an aspherical surface.

As expected on Zeiss lenses, all the markings are engraved and painted in rather than screen-printed… however, in yellow rather than the standard white. The full Zeiss logo (in blue) is inset into both the barrel and the lens cap. The mounting index marks is also in Zeiss blue which is a nice little touch.

The Otus 55mm f1.4 is also designed to give a very high level of optical correction again via the use of an aspherical element and six made from glass with anomalous partial dispersion characteristics. Zeiss says this design eliminates "nearly all possible flaws" from distortion to axial chromatic aberrations. With the highest contrast performance over the entire image field even at the maximum aperture of f1.4, the 55mm delivers a convincing "medium format look" when used on the high-end Canon or Nikon D-SLRs with full-35mm sensors.

Notable performance characteristics for the Zeiss Otus lenses include phenomenal levels of detailing, exceptional uniformity of sharpness and brightness, and consistently high contrast.

The precision engineering is evident in the smoothness of focusing collars and the positive action of the aperture rings. These lenses really are optical works of art and deliver superlative results even when shooting at f1.4 – as well as extremely effective correction for both distortion and chromatic aberrations.

## ZEISS BATIS

**DESIGNED TO DELIVER** exceptional image quality with Sony's full-35mm E-mount mirrorless cameras – including the 42 MP A7R II – Zeiss's Batis series lenses are currently available in 25mm f2.0 wide-angle and 85mm f1.8 short telephoto models.

These lenses make optimal use of the camera sensors, capturing every last detail with impressive contrast and high resolution. As well as offering fast and reliable autofocusing via linear motors, the Batis lenses also support manual focusing, allowing users to choose the best option for each individual situation. The sleek and modern external styling with smooth surfaces (reminiscent of the high-end Zeiss Otus lenses) emphasises the superior quality of this lens family and gives each model an unmistakable look and feel. More practically, the barrels are sealed against the intrusion of dust or moisture, allowing the Batis lenses to be used in bad weather or extreme environments.


A unique feature is an OLED-type display which provides a digital read-out of the focusing distance. Easy to read even in low light, these displays show the exact distance between the camera and the focal plane as well as the depth-of-field. Both Batis lenses have a 'floating element' optical design which compensates for aberrations of the lenses at different distance settings. Both models also have a standard screwthread filter fitting with a diameter of 67 mm, and employ Zeiss's T* multi-coating to minimise ghosting and flare.

The Batis 25mm f2.0 wide-angle lens's optical construction comprises ten elements in eight groups. This includes four double-sided aspherical elements and five made from special types of optical glass to ensure a consistently high image quality across the whole image field and a sharpness that extends right to the corners of the frame.

The Batis 85mm f1.8 short telephoto has an 11-element optical construction in the Zeiss Sonnar design. These elements are made from various types of special glass designed to deliver superior image quality, including a high level of correction for chromatic aberrations. This model incorporates optical image stabilisation to enable hand-held shooting in a wider selection of lighting situations.


# Quality And Control

## THE ART OF SIGMA'S ART LINE LENSES

### ❶ SIGMA ART 24mm f1.4 DG HSM

**SIGMA CLASSIFIES ITS** lenses according to the main area of application, and these categories are Art, Sports and Contemporary.

The Art series lenses are designed and built with optimum quality and performance as the primary objectives yet somehow Sigma manages to factor in a degree of affordability without any compromises. Make no mistake, the Art primes are a match for anything from the prestigious German marques in terms of both their optical performance and the mechanical fit and finish. The 24mm f1.4 joins the 35mm and 50mm Art primes in the winner's circle and – along with the 24-35mm f2.0 zoom – Sigma has collected just about every major product design award there is.

While largely traditional in its concept and design, the 24mm Art employs a number of contemporary technologies including a composite material called 'Thermally Stable Composite' (TSC) which is designed to maintain fine tolerances through a greater range of operating temperatures. The 15-element optical construction includes three elements made from Sigma's 'F Low Dispersion' glass which has been formulated to give a refractive index and dispersion characteristics similar to those of fluorite-type elements. There are also four made from 'Special Low Dispersion' glass to further assist with reducing chromatic aberrations, and two aspherical types which help correct for distortion. The optical layout places the aspherical elements at the rear and so adjusts the incidence angle of the incoming light rays, allowing for great performance when shooting wide open. The 24mm Art wide-angle is available in the Canon, Nikon and Sigma mounts.

### ❷ SIGMA ART 20mm f1.4 DG HSM

**THE LATEST ADDITION** to the Art series, the 20mm f1.4 gives an expansive angle-of-view of 94.5 degrees on a full-35mm format sensor. It has an optical construction comprising 15 elements in 11 groups and which includes two made from 'F Low Dispersion" (FLD) optical glass, and five made from 'Special Low Dispersion' (SLD) glass.

Additionally, there are two aspherical elements, including one large-diameter type which helps make this combination of ultra-wide focal length and large maximum aperture achieveable.

The 20mm f1.4's advanced optics are designed to minimise spherical aberration, axial chromatic aberration and field curvature, giving an outstanding image quality with a performance to match the capabilities of the latest ultra-high resolution D-SLRs.

The minimum focusing distance is 27.6 centimetres, and a nine-bladed diaphragm ensures beautifully smooth out-of-focus effects, especially beneficial with a lens which offers such an inherently wide depth-of-field. These characteristics make this lens suitable for a variety of applications, including landscape photography, astrophotography, lowlight/indoor photography and event photography. The 20mm Art is compatible with Sigma's USB dock for firmware upgrades and is also compatible with the Mount Conversion Service. It's available in Canon, Nikon and Sigma mounts.

### ❸ SIGMA ART 24-35mm f2.0 DG HSM

**THE WORLD'S FIRST** zoom for the full-35mm sensor format with a maximum aperture of f2.0, the 24-35mm Art lens is designed to deliver the performance of primes combined with the versatility of a zoom.

Its 18-element optical construction includes one made from Sigma's FLD glass – with performance equal to fluorite – and seven SLD types to provide a high degree of correction for chromatic aberrations throughout the focusing range. Two aspherical elements provide correction for distortion and ensure exceptional uniformity of centre-to-corner frame brightness. Sigma's 'Super Multi-Layer Coating' is employed to reduce flare and ghosting.

The 24-35mm Art zoom's physical construction employs an advanced material called 'Thermally Stable Composite' (TSC) which is designed to maintain fine tolerances through a greater range of operating temperatures. Other notable features include a nine-blade diaphragm for smoother out-of-focus effects, a minimum focusing distance of 27.9 centimetres (giving a maximum magnification ratio of 1:4.4 at 35mm) and Sigma's silent 'HSM' ultrasonic focusing drive with a full-time manual override. The choice of lens mounts for this model comprises Canon, Nikon or Sigma.

## NEED MORE INFORMATION?

More details about any of the products featured on these pages are available from:

**C.R. Kennedy & Company Pty Ltd**, 300 Lorimer St, Port Melbourne, Victoria 3207. Please telephone (03) 9823 1555 or visit **www.crkennedy.com.au**

Alternatively, contact your nearest C.R. Kennedy & Company state office in NSW, Queensland, South Australia and Western Australia.

C.R. Kennedy & Company is the exclusive Australian distributor for many of the most respected names in imaging; including Pentax, Sigma, Ricoh, Hoya, Metz, Tamrac, Tokina, Kenko, Lenspen, Hasselblad, HPRC, F-Stop, Bowens, Slik, Ilford Photo, Harman, Schneider, Vanguard, X-Rite Photo and Zeiss

# f-stop

## GREAT PHOTO BACKPACKS FOR THE GREAT OUTDOORS

**COLLABORATING WITH PROFESSIONAL** outdoor photographers, the designers at f-stop have rethought what's required to carry camera or video equipment in to remote locations or extreme environments. F-stop has created a range of heavy-duty photo backpacks that are designed to keep protecting equipment in challenging conditions as well providing a variety of design innovations to make them more comfortable and convenient to use in any location from inner city to the outback.

F-stop's Mountain Series of packs combine durability with practicality so they work efficiently and effectively on location, ensuring that photographers can focus on getting their pictures rather than worrying about the safety of their equipment.

### SHINN SERIES

Specifically designed to haul larger camera systems, the 80-litre Shinn is the largest camera pack f-stop has ever created. It's especially suited to hauling large video rigs or super telephoto D-SLR set-ups. Featuring an Oxford-weave ripstop nylon and Advanta shell, the Shinn offers superb water and abrasion resistance. A full-size, super-duty suspension system combined with optimised weight distribution from the aluminium frame and ICU provide exceptional stability and comfort. As with all the Mountain Series packs, the Shinn is fully capable of outer expansion and customisation thanks to a variety of strategically-placed mounting points.

### SUKHA SERIES

The 70-litre Sukha model is f-stop's latest expedition-ready camera backpack. Paired with the new Master Tele ICU, the Sukha can accommodate super telephoto lenses with mounted D-SLR bodies or most rigged video setups for run-and-gun accessibility. This model features Oxford-weave ripstop nylon and Advanta which gives the shell excellent water and abrasion resistance. The Sukha is built for expansion and features 16 'GateKeeper' attachment points strategically located on the outside. In addition to shock cords, loops, and Molle webbing, a variety of components can be mounted offering limitless possibilities for expansion and customisation.

### TILOPA SERIES

The new Tilopa pack remains the marque's all-rounder of the f-stop Mountain Series, now packing 50 litres of volume without any physical size difference from its predecessor. Built for the back country, the Tilopa is equipped with all the necessary attachment points and dedicated compartments to accommodate an assortment of gear, skis and poles. A new Oxford-weave ripstop nylon and Advanta shell is reinforced with Hypalon in key areas to provide exceptional weather and abrasion protection.

### ANJA SERIES

The new Ajna is the everyday mountain pack. With 40 litres of volume, the low-profile Ajna features a lightweight harness system which provides comfort without adding unnecessary weight. It also features carefully angled Molle attachment points on the waist belt for secure accessory attachment. As the most versatile of the Mountain Series packs, the Ajna is fully compatible with F-stop's Pro, Shallow and Micro ICU's. The Ajna utilises a new standard Oxford-weave ripstop nylon and Advanta, giving it exceptional water and abrasion resistance.

### LOTUS SERIES

The Lotus is the narrow and nimble everyday mountain pack. With 32 litres of volume, this low-profile packs blends just as well in urban settings as it does in the mountains. Lotus's lightweight harness system provides comfort without adding unnecessary weight. It also features carefully angled Molle attachment points on the waist belt for secure accessory attachment. The Lotus uses the new standard Oxford-weave ripstop nylon and Advanta to give excellent water and abrasion resistance.

### KASHMIR UL SERIES

A first of its kind, the Kashmir is an ultra-light, backcountry-bred adventure camera pack designed specifically for a woman's frame. For increased comfort and better balance, the Kashmir features specially designed shoulder straps and a shorter frame. The Kashmir Ultralight daypack is the camera industry's first product to acknowledge the huge contribution that women make to professional adventure photography.

# FUJIFILM X-T1

REPORT BY PAUL BURROWS


# BIG GAME HUNTER

**Fujifilm goes hunting for D-SLR defectors with its X-T1, which further refines its X Mount compact system camera formula – adding, among other things, weather-proofing and more dials.**

It's been a few years since Fujifilm's S5 Pro disappeared, and since then the ranks of D-SLR brands have continued to thin as the product planning emphasis has switched to the mirrorless compact system cameras. Yet it's also taken a while for anybody to actually come up with a truly credible alternative CSC to the D-SLR, partly because the early emphasis was on upgrading compact camera users, and secondly because electronic viewfinders simply weren't good enough.

Fujifilm's solution to the latter was its hybrid optical/electronic arrangement, introduced in the original X100 and reprised in the X-Pro1. Subsequently, there have been all sorts of improvements to 'pure' electronic viewfinders – OLED panels being one of them – so it's now possible to move away from the rangefinder-style cameras such as the X-Pro1 and Sony's NEX-7… the two models most notable for being clearly aimed at enthusiast-level or even pro users. Then came Olympus's OM-D system with, most significantly, the flagship E-M1 intended as a direct replacement for Olympus's last D-SLR, the E-5. Now Fujifilm is doing the same thing with the X-T1… it's not just a high-end CSC, but also the spiritual successor to the S5 Pro. Ironically though, it's even more SLR-like than its reflex ancestor thanks to its squared-off styling and a full suite of traditional control dials packed onto the top panel. If you didn't know better, you'd hazard it was a 35mm SLR from the mid-to-late 1970s… there's more than a hint of Contax's RTS models in the looks. All that's really missing externally – at least from front-on – is the old 'Fujica' badging.

## NEW INGREDIENTS

Essentially, the basic ingredients of the X-T1 are the same as those

of the other higher-end X Mount models – it has the same sensor as the X-E2 and X100S, the same AF and AE systems as the X-E2, and the same retro-inspired design philosophy that's been applied across the system.

However, there are some important new ingredients which considerably spice up the recipe. Apart from the SLR-like styling – and, ironically, the X-T1 is better looking than any D-SLR on the market at the moment, including Nikon's Df – there's a fully weather-proofed bodyshell, the dial-based operations are expanded, the EVF experience has been further enhanced, the AF system is upgraded and various key specifications move up a notch or two – notably the maximum ISO setting and the continuous shooting speed. Importantly too, the little omissions which where niggling rather than serious – but annoying nonetheless – have been corrected. At the top of this list is white balance bracketing (at last!), but also notable is that the focus peaking display can now be set to different colours to work more effectively with different subjects and lighting. The choice is white, red or blue with the option of high and low intensities.

The X-T1 is accompanied by quite a few dedicated accessories, including a vertical battery grip – the VG-XT1 – which houses an additional battery pack, extending the camera's range to 700 shots. There's also a 'passive' handgrip similar to those offered for the X-Pro1 and X-E2, plus a smart leather case for anybody who wants to go all the way with the classical look.

Due soon is the first weatherproofed X Mount lens, the XF 18-135mm f3.5-5.6 R OIS WR which will be followed by the XF 16-55mm f2.8 R OIS WR and the XF 50-140mm f2.8 R OIS WR later in the year. Fujifilm has been pretty diligent about building its X Mount lens system as quickly as is possible and the current Fujinon line-up numbers 12 (although two are XC type lenses without an aperture collar and designed primarily for use on the consumer-level cameras).

However, the XF models now include the recently arrived XF 10-24mm f4.0 R OIS wide-angle zoom and XF 56mm f1.2 R superfast short telephoto. There are also the Zeiss Touit models for those with deeper pockets.

> "THERE IS LITTLE DOUBT FUJIFILM'S 'X-TRANS CMOS II' SENSOR IS ONE OF THE BEST 'APS-C' IMAGERS IN THE BUSINESS, IF NOT AT THE VERY TOP OF THE CLASS."

Without doubt, Fujifilm's efforts with its X Mount lenses – and their impressive performance, both the zooms and the primes – has helped put some extra polish on the appeal of the X-E2 and now the X-T1. It's also why the X-T1 is quite capable of breaching the D-SLR stronghold… these lenses are as good as anything on offer from Canon, Nikon or Sony, even in the full-35mm format.

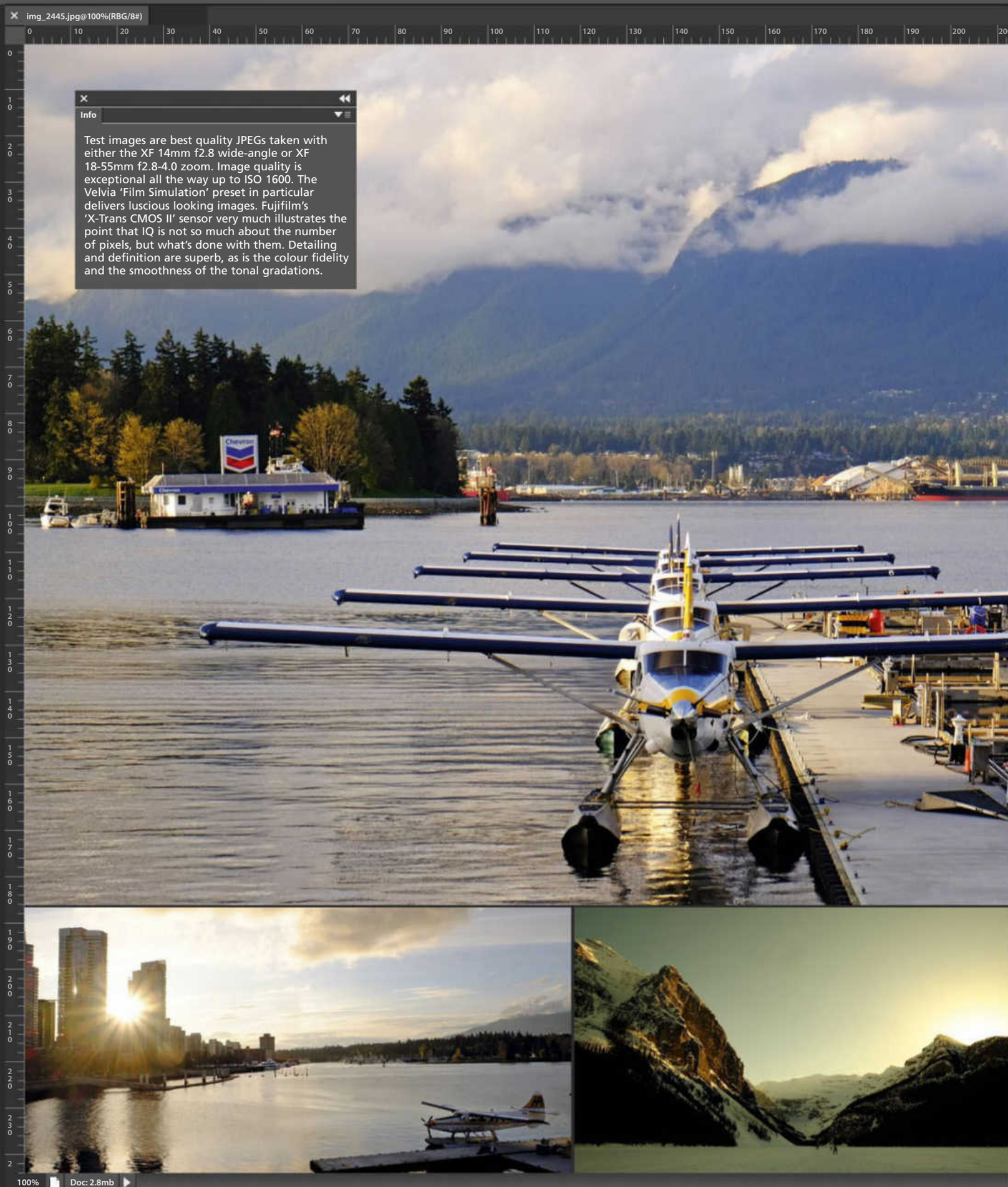
## DIALLED UP

In the flesh, the X-T1 is a lot more petite than illustrations might suggest. It is, in fact, marginally smaller in every dimension than the OM-D E-M1, but virtually the same weight. It's only slightly bigger than the very petite OM-D E-M5.

The construction is all-metal – aluminium covers over a diecast magnesium alloy chassis – with a total of 80 seals to guard against the intrusion of dust and moisture plus insulation to allow operation in temperatures down to -10 degrees Celsius. The dials are all milled from solid billets of aluminium with engraved markings and now, as on the Nikon Df, include one for setting the ISO, as well as for shutter speeds and exposure compensation. As with these latter two dials (and the aperture collars on the XF lenses), switching the ISO dial to enable automatic setting of the sensitivity is simply a case of selecting its 'A' position. In this regard then, the X-T1 is even more old school than the deliberately retro Df… and it doesn't need an exposure mode dial; it's just a case of switching the shutter speed dial and aperture collar to whatever combination of 'A' settings is required. The shutter speed dial locks on its 'A' setting while the ISO dial locks on every setting – which include 'L', 'H1' and 'H2' for the extended sensitivities – presumably because accidental changes here could be more disastrous.

With the top panel real estate fully taken up with dials, and the need to keep the viewfinder housing's size in proportion with the rest of the compact body, the X-T1 does without a built-in flash, but Fujifilm bundles in a small accessory unit. It has a metric guide number of eight at ISO 200 and, once fitted, provides all the same modes as the X-E2's built-in flash (including remote triggering of photocell-equipped units). External flashes sync via the hotshoe or a PC terminal.

Beyond the main dials, there are selector levers for the drive modes and metering patterns…


img_2445.jpg@100%(RBG/8#)
Info
Test images are best quality JPEGs taken with either the XF 14mm f2.8 wide-angle or XF 18-55mm f2.8-4.0 zoom. Image quality is exceptional all the way up to ISO 1600. The Velvia 'Film Simulation' preset in particular delivers luscious looking images. Fujifilm's 'X-Trans CMOS II' sensor very much illustrates the point that IQ is not so much about the number of pixels, but what's done with them. Detailing and definition are superb, as is the colour fidelity and the smoothness of the tonal gradations.
Chevron
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although Fujifilm still actually calls them dials. The former is located below the ISO dial and includes settings for the auto bracketing functions, a multiple exposure facility, the 'Advanced Filter' effects and 'Motion Panorama' shooting. Front and rear input wheels do most of the setting in conjunction with the main menus and a 'Quick Menu' control screen. The shutter release button loses the cable release socket that's been a feature of all the higher-end X Series models to date.

In the hand, the X-T1 feels quite weighty and the handgrip is very comfortable. As we noted with the Nikon Df, it's a case of unlearning some digital camera habits such as finding the ISO button or its menu. Commendably, the AE and AF locks have their own buttons (just like in the good old days) and the exposure compensation dial has some pretty solid click-stops to reduce the possibility of inadvertently changing settings. Six buttons can be customised with user-assigned functions; one each on the top and front panels, and the four navigator keys.

## KEEPER FINDER

Of course, under the X-T1's top panel 'bump' is an electronic viewfinder, but it's partially more pronounced because of the improvements Fujifilm has made here. It's the same 1.3 cm OLED panel with 2.36 million dots resolution as is used in the X-E2, but the magnification is increased to 0.77x magnification and the angle-of-view to 31 degrees. Additionally, lag is claimed to be reduced to just 0.005 seconds. Put simply, it's big and very nearly beautiful.

Viewfinders are a big deal for Fujifilm and beyond its clever hybrid optical/electronic arrangements, it's worked to make the pure EVF more acceptable. Consequently, the X-T1's finder has a new display design which is more like that of a traditional optical finder in that all the read-outs are located outside the image area. These displays also automatically re-orientate when the camera is held vertically and there's an interesting 'Dual' mode which, when focusing manually, puts the 'Digital Split Image' display (or a magnified image section) alongside the image area. Yes, there's that much space in there. On both the X-E2 and X100S, the split image overlay rather gets in the way so this arrangement addresses this issue (it can also be done with the focus peaking display operating in the magnified image section).

> "IN THE FLESH, THE X-T1 IS A LOT MORE PETITE THAN ILLUSTRATIONS MIGHT SUGGEST. IT IS, IN FACT, MARGINALLY SMALLER IN EVERY DIMENSION THAN THE OM-D E-M1."

The X-T1's monitor screen is the same 7.62 cm LCD panel as is used on the X-E2, but with the addition of a tilt adjustment and a reinforced glass faceplate. It also benefits from a faster refresh rate.

Fujifilm still hasn't embraced touch controls, but the 'Q.Menu' control screen provides quick access to a wide selection of capture-related functions.

A proximity sensor in the EVF eyepiece allows for automatic switching between the displays or it can be done manually via the 'View Mode' button.

## COLOUR AND CONTRAST

At the heart of the X-T1 is Fujifilm's 'X-Trans CMOS II' sensor with its unique colour filter pattern that's designed to minimise moiré patterns. The total pixel count is 16.7 million (16.3 MP effective) which doesn't look particularly exciting by current full-35mm D-SLR standards, but this sensor is a prime example of quality over quantity, leading Fujifilm to claim a 'big sensor' performance from its 'APS-C' format device.

A key aspect of this is the 6x6 filter pattern designed to reduce the occurrence of moiré patterns, but Fujifilm is also starting to tie together all the other elements it's been releasing with subsequent X Series camera into a more cohesive message about superior image quality. These include the 'Lens Modulation Optimiser' (LMO) processing – a power-hungry function derived from the 'EXR Processor II' chip which detects and corrects for diffraction blur – and the 'Film Simulation' picture presets. These have been around from the very beginning, but Fujifilm is starting to make more of them, exploiting the company's long experience in colour management and reproduction.

One component of the Australian press preview of the X-T1 was a very enlightening explanation of how the colour

## MAKING MOVIES

Video clips are recorded in the Full HD 1080p or HD 720p resolutions – at either 30 or 60 fps – in the MOV format with MPEG 4 AVC/H .264 compression. At 1080/60p, the bit rate is an impressive 36 Mbps.

The X-T1 has built-in stereo microphones and a non-standard 2.5 mm stereo audio input for connecting an external mic (it's otherwise the remote controller's socket). Audio recording levels are manually adjustable.

Among the functions available for shooting video are continuous AF, the 'Film Simulation' presets and +/-2.0 EV of exposure compensation. There's now a dedicated recording start/stop button (a first on an X Mount camera). Apertures and shutter speeds need to be preset. The X-T1 isn't alone in offering fairly limited video functionality and, consequently, it isn't going to challenge the leaders in this area, headed by Panasonic's GH4.


The X-T1 doesn't have a built-in flash, but comes bundled with a small accessory unit which, when folded down, is quite compact.



processing is specifically tweaked for the Provia, Astia and Velvia presets; and the contrast for the Pro Neg Standard and Pro Neg High presets. It's all about balancing colorimetric – or real colour – with expected or 'memorised' colour. So, for example, the saturation of blues and greens are boosted – i.e. they're made deliberately higher than the colorimetric value – because that's how we tend to remember them. In general, the Astia preset is shifted slightly to yellow and Velvia is shifted to cyan (i.e. bluish-green), but Provia stays close to the colorimetric values. The Pro Neg presets are all about accurately reproducing skin tones, particularly when using contrastier lighting such as studio flash.

Up to seven customised 'Film Simulation' presets can be created via adjustments for colour, sharpness, dynamic range and gradation. Additionally, for RAW shooters, the 'Film Simulation' profiles are now supported in the latest version of Adobe Camera Raw.

The effective pixel count remains at 16.3 megapixels, giving a maximum image size of 4896x3264 pixels. There's a choice of 3:2, 16:9 or 1:1 aspect ratios with three JPEG image sizes in each and the choice of Normal or Fine compression levels. RAW capture is at 14-bits per RGB channel and the RAW+JPEG capture can be set to JPEG/large/fine or large/normal. There's a single card slot for the SD format, but importantly, it's separated from the battery compartment and located on the handgrip so changeovers are easy do to with the camera on the tripod. The X-T1 is the world's first camera with support for UHS-II speed SDXC cards.

## QUICK SMART

The Mark II 'X-Trans' CMOS sensor incorporates dedicated pixel arrays for phase-difference detection autofocusing which is employed in conjunction with contrast detection measurements depending on the subject or situation. A key upgrade here is a 'Motion Predictive' capability when using the continuous AF mode which monitors a subject's speed and rate of acceleration/deceleration to better determine the final focusing point.

Continuous shooting with AF tracking is possible at up to 8.0 fps – compared to the X-E2's 7.0 fps – and burst lengths are increased with the new UHS-II speed SDXC memory cards. The focusing modes are selected via a switch on the front panel which has settings for manual, continuous AF and single-shot AF. Additionally, a 'Pre-AF' function can be engaged from the shooting menu and this maintains AF operations at all times rather than just when the shutter button is pressed to its half-way position.

Similar to the X-E2, the AF system uses 49 measuring points arranged in a 7x7 array which covers a good part of the frame. The points are individually selectable in both the single-shot and continuous modes. Additionally, there's a choice of three focus frame sizes – designated 50, 100 or 150 percent.

We've already mentioned a couple of the changes made to the manual focusing assists. When using the monitor screen, the dual mode is also available for both the 'Digital Split Image' or a magnified image section. As in the EVF, the latter can be combined with the focus peaking display. Alternatively, full screen magnification is available along with the focus peaking display which is particularly effective when set to red and high intensity. Because the main image area becomes smaller in the dual mode, the real-time histogram (if active) is located outside it, but the grid pattern and level display remain as before.

## GET THE PICTURE

The exposure control facilities are pretty much the same as those of the X-E2, but with the exception that the ISO expansion now steps up another stop to 51,200 due mainly to an inherently lower noise in the main circuit board (the native range remains at ISO 200 to 6400). The Auto ISO control can be set to default ISO, maximum sensitivity and minimum shutter speed.

Like its immediate siblings, the X-T1 sticks with a standard set of 'PASM' exposure control modes and the usual selection of overrides – program shift, an AE lock, up to +/-3.0 EV of compensation and bracketing with up to +/-1.0 EV adjustment per frame. Metering is based on the 256-segment multi-zone system Fujifilm has been using since the X100 with the option of centre-weighted average or spot


measurements. The exposure compensation dial, by the way, is click-stopped in one-third stop increments. The X-T1's focal plane shutter has a speed range of 30-1/4000 second as plus a 'B' setting with a maximum duration of 60 minutes. The shutter speed dial is marked from 1/4000 second down to one second, so the slower speeds are accessed via a 'T' setting and selected via the left/right navigation keys. As on the X-E2, there's a setting for the maximum flash sync speed of 1/180 second (marked as '180x').

There's a choice of eight 'Advanced Filter' special effects which, as on the X-E2, are applied at capture. These are called Toy Camera, Miniature and Pop Colour, High-Key, Low-Key, Dynamic Tone, Soft Focus and Partial Colour (which can be set to red, orange, yellow, green, blue or purple).

The white balance controls are the same as those provided on the X-E2 which use automatic correction based on scene recognition analysis. There's a selection of seven presets (including for daylight, warm and cool fluoro lighting), provision for making one custom measurement, fine-tuning and manual colour temperature selection over a range 2500 to 10,000 degrees Kelvin. The fine-tuning is available for everything and applied over nine steps in the colour ranges of red-to-cyan and blue-to-yellow. Obviously this can be previewed both in the EVF and on the LCD monitor. As noted earlier, white balancing bracketing is now available and joins the other auto adjustments for exposure, 'Film Simulation', dynamic range and ISO. All operate over a sequence of three frames.

**"IRONICALLY, THE X-T1 IS EVEN MORE SLR-LIKE THAN ITS REFLEX ANCESTOR THANKS TO ITS SQUARED-OFF STYLING AND A FULL SUITE OF TRADITIONAL CONTROL DIALS PACKED ONTO THE TOP PANEL."**


Front (below) and rear input wheels – Fujifilm calls them 'Command Dials' – perform a wide range of selecting and setting duties.

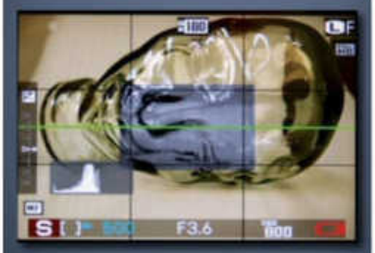

Focus Assist button engages the various assist displays for manual focusing plus a magnified image view when using autofocusing.


The hotshoe is supplemented by a PC flash terminal.


Wireless functionality is expanded to include remote control of various camera settings.


The X-T1's menu is clearly laid out and easy to navigate. Progressive right-clicks access sub-menus and settings.


'Film Simulation' presets tweak colour saturation, hue, contrast and sharpness to replicate the 'look' of Fujifilm's famous Fujichrome transparency films.




The live view screen can be configured to show a real-time histogram, level display, guide grids and a variety of read-outs.


Focus peaking display can now be adjusted for colour and intensity. Red and High is a particularly effective combination.


The 'Quick Menu' control screen provides direct access to a wide selection of capture functions.

The X-T1's dynamic range expansion processing can be set to Auto or to one of three manual settings – 100, 200 and 400 percent – with the latter two becoming available progressively at ISO 400 and 800 respectively. DR processing can't be switched off. The auto correction is based on the brightness range in the scene and adjusts both the exposure and the tone curve as required. Noise reduction can be manually set to one of five levels (Low, Medium Low, Standard, Medium High and High) while the long exposure NR is simply switched to either on or off.

The X-T1 also has an intervalometer for shooting time-lapse sequences and in-camera corrections for lens distortion (both barrel and pincushion), colour shading (along cyan-to-red and blue-to-yellow ranges) and vignetting (a.k.a 'Peripheral Illumination Correction'). The 'Motion Panorama' mode mentioned earlier captures multiple images while the camera is being panned. There's the choice of 180 or 360 degree pans and left/right or up/down directions.

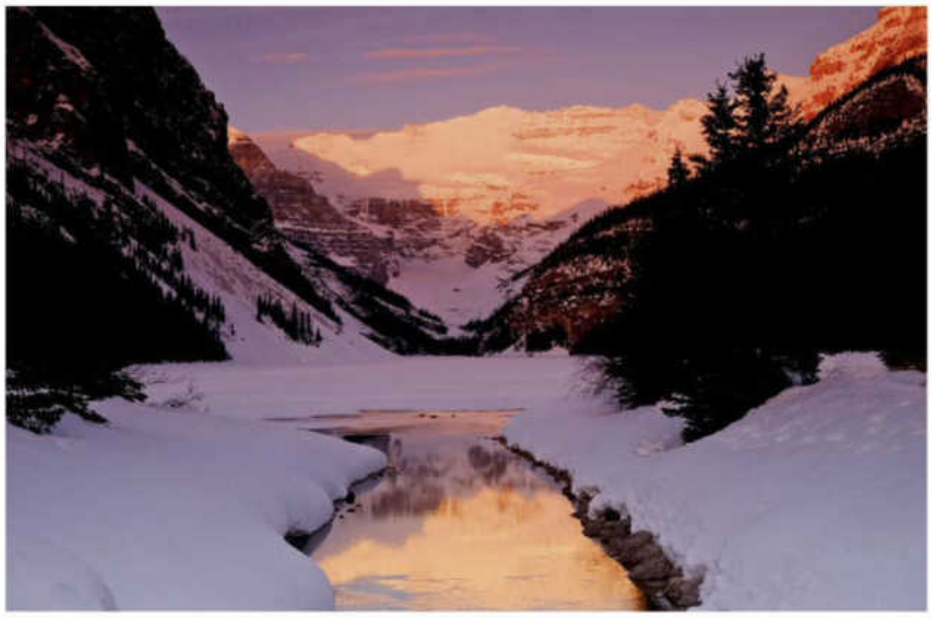
Fujifilm continues to improve the functionality of its wireless connection which was pretty rudimentary at the start. It now extends beyond simple file transferring to live view and camera controls using the new Fujifilm Camera Remote app on a compatible smartphone or tablet. This functionality includes 'Touch AF' and the capacity to apply settings such as the 'Film Simulation' presets.

## MAKING A DISPLAY

Both the EVF and the monitor screen can be switched between standard and customised displays, or all info can be switched off. The custom display is pre-configured from a checklist (accessed via 'Screen Set-Up' in the Set-Up Menu) which includes exposure preview (in manual mode), a distance/depth-of-field scale, a real-time histogram, superimposed grids (either 3x3, 6x4 or HD video), a single-axis level indicator, plus a big choice of read-outs or icons for, among other things, white balance, the 'Film Simulation' preset, the DR setting, exposure compensation, metering mode and battery power level. All the items in the custom display are switchable so any desired combination can be created.

The Screen Set-Up menu also allows for changing the highlight or background colour for the menus, and the choice is silver, gold, blue, yellow, green or white. This also changes the colour of a few other display items such as the level indicator.

The monitor has a third display mode for info only, and is mainly designed to be used in conjunction with the EVF. It provides an AF point grid and a selection of capture function indicators, including an exposure under/over scale. The replay/review screen can also be set to configurations, including a thumbnail accompanied by capture data, highlight warning and a brightness histogram. A set of 'Photo Information' screens – similar to those provided on Nikon's D-SLRs – are viewed via the up/down navigation keys. The slide show functions include fades, zooms and multiple images. The playback modes include a variety of multi-image displays as well as straight pages of nine or 100 thumbnails, zooming on the focus point and Fujifilm's 'PhotoBook Assist' feature which allows for up to 300 images to be organised for reproduction in a photo book.



## SPEED & PERFORMANCE

With our reference memory card – Lexar's Professional 600x 64 GB SDXC UHS-I speed device – the X-T1 recorded a burst of 34 JPEG/large/fine frames in 3.973 seconds which represents a continuous shooting speed of 8.56 fps. This is slightly faster than the quoted maximum and, although slightly off the quoted burst length, the reality is that few users are ever going to want a sequence of over 30 frames. For the record, the test file sizes were around 6.4 MB on average. The buffer memory empties very quickly indeed with a UHS-I card so presumably it's lightning fast with a UHS-II device as the data writing speed essentially doubles.

Given the X-T1 has essentially the same digital 'drive train' as the X-E2, the image quality is comparable which means it's very good indeed. There is little doubt Fujifilm's 'X-Trans CMOS II' sensor is one of the best 'APS-C' imagers in the business, if not at the very top of the class. It continues to surprise us with just how well it performs even compared to bigger sensors. Definition and detailing, the colour fidelity across the spectrum, the contrast and tonal gradation are all excellent. The best quality JPEGs look sensational straight out of the camera, especially with the Velvia 'Film Simulation' preset which beautifully replicates the distinctive 'punch' of the much-loved Fujichrome transparency film.

The low light performance is equally impressive and noise simply isn't an issue even at ISO 1600 where the colour saturation and sharpness look no different than at ISO 200. Everything holds together pretty well at ISO 3200 and 6400, but with some colour noise evident in areas of uniform tone. Both the push settings exhibit increased noise, but are still useable if only small-sized reproductions are needed. Operationally, the X-T1's hybrid autofocus is both fast and accurate, and the tracking works very effectively. Fujifilm quotes a speed of just 0.08 seconds with the 14mm f2.8 lens, which is claimed to be currently the world's fastest for a camera with an 'APS-C' size sensor (or larger). Start-up is virtually instantaneous and shutter lag is quoted at just 0.05 seconds which, not entirely surprisingly, is the same as the X-E2.

## THE VERDICT

The X-T1 is really the sum of everything Fujifilm has learned since launching the X-Pro1 – particularly in terms of AF operation, improving the 'pure' EVF and refining a dial-based operating system for the digital age. Still a very fine camera two years on, nevertheless the X-Pro1 is an acquired taste while the X-T1 is designed to have more mainstream appeal with its SLR-like configuration.

The styling and design exhibit a lighter touch than that of Nikon's Df, helped of course, by the fact that the X-T1 is much smaller, but there's a cohesion and balance here that makes this a very special camera indeed. Add the intuitive control layout, a best-in-class EVF, a solid feature set, strong camera performances (AF, shooting speed, etc) and the capabilities of the 'X-Trans II' sensor, and Fujifilm's X-T1 is the most compelling and cohesive argument yet for ditching the D-SLR.

## VITAL STATISTICS

## FUJIFILM X-T1 $1699 * body only.

**Type:** Fully automatic digital camera with Fujifilm X bayonet lens mount.
**Focusing:** TTL automatic with hybrid phase-difference/contrast-detection measurement with 49 focusing points. Auto/manual point selection and centre-point mode. Focus frame adjustable for size. Manual switching between single-shot and continuous modes. Face detection and auto tracking modes. Sensitivity range is EV 0 - 18 (ISO 100). Low light/contrast assist provided by built-in illuminator. Manual focus assist via magnified image, focus peaking display or 'Digital Split Image' electronic rangefinder.
**Metering:** 256-point multi-zone, centre-weighted average, spot and TTL flash. Metering range is EV 0 to 18 (ISO 100/f2.0).
**Exposure Modes:** Continuously-variable program with shift, shutter-priority auto, aperture-priority auto and metered manual.
**Shutter:** Electronic, vertical travel, metal blades, 30-1/4000 second plus 'B' (up to 60 minutes). Flash sync up to 1/180 second. Exposure compensation up to +/-3.0 EV in 1/3-stop increments.
**Viewfinder:** 1.3 cm OLED-type EVF with 2.36 million dots resolution. 0.77x magnification and 100% vertical/horizontal scene coverage. Automatic/manual switching between the EVF and the LCD monitor screen. Eyepiece strength adjustment built-in.
**Flash:** No built-in flash, but accessory EF-X8 unit included and has a metric guide number of 8.0 (ISO 200). Auto, red-eye reduction, fill-in, first/second curtain sync, slow sync modes and remote trigger modes available. External flash units connect via ISO standard hotshoe or PC sync terminal.
**Additional Features:** Magnesium alloy bodyshell with sealing against dust and moisture, AE/AF lock, auto exposure bracketing (up to +/-1.0 EV over three frames), multiple exposure function, dual-delay self-timer (2 or 10 seconds), audible signals, auto power-off, wired remote trigger.

### DIGITAL SECTION

**Sensor:** 16.7 million (total) pixels 'X-Trans CMOS II' with 23.6x15.6 mm imaging area and 3:2 aspect ratio. Sensitivity equivalent to ISO 200-6400, extendable to ISO 100, 12,800, 25,600 and 51,200.
**Focal Length Magnification:** 1.5x.
**Formats/Resolution:** Two JPEG compression settings, RAW output (lossless compression) and RAW+JPEG capture. Three resolution settings at 3:2 aspect ratio; 4896x3264, 3456x2304 and 2496x1664 pixels. Three resolution settings at 16:9 aspect ratio; 4896x2760, 3456x1944 and 2496x1408 pixels. Three resolution settings at 1:1 aspect ratio; 3264x3264, 2304x2304 and 1664x1664 pixels. 24-bit RGB colour for JPEGs, 42-bit RGB colour for RAW files.
**Video Recording:** MOV format at 1920x1080 pixels, 60 or 30 fps (progressive scan) and 16:9 aspect ratio, and 1280x720 pixels, 60 fps or 30 fps and 16:9 aspect ratio. MPEG 4 AVC/H .264 compression. Stereo microphones built-in. Stereo audio input provided. Full HD clip length limited to 14 minutes.
**Recording Media:** SD, SDHC (with UHS-I support) and SDXC (with UHS-II support) memory cards.
**Continuous Shooting:** Up to 47 JPEG/large/fine frames at up to 8.0 fps with continuous AF. Low speed mode captures at 3.0 fps.
**White Balance:** TTL measurement. Auto mode, seven presets and one custom settings. White balance compensation (amber-to-blue and/or green-to-magenta) in all presets. Manual colour temperature setting from 2500 to 10,000 degrees Kelvin.
**Interfaces:** USB 2.0, HDMI mini connector (Type C), 2.5mm stereo audio input.
**Additional Digital Features:** Sensor cleaning, 7.62 cm LCD monitor (1.04 million dots) adjustable for tilt, ten 'Film Simulation' modes (Standard/Provia, Vivid/Velvia, Soft/Astia, Pro Neg High, Pro Neg Standard, Monochrome, Monochrome+Yellow, Monochrome+Red, Monochrome+Green, Sepia), eight 'Advanced Filter' effects (Toy Camera, Miniature, Pop Colour, High-Key, Low-Key, Dynamic Tone, Soft Focus, Partial Colour), 'Motion Panorama' modes (vertical and horizontal, two image sizes), intervalometer/time lapse, dynamic range expansion (Auto, 100%, 200%, 400%), adjustable image parameters (colour saturation, sharpness, highlight tone, shadow tone), multiple exposure capture, real-time histogram, electronic level display, grid displays (3x3 or 6x4), guidance displays, depth-of-field preview, bracketing functions (AE, Film Simulation, Dynamic Range, ISO, White Balance), 'Lens Modulation Optimiser' (LMO) processing, high ISO noise reduction, long exposure noise reduction, seven custom set-up memories, sRGB and Adobe RGB colour space settings, playback/editing functions (RAW Conversion [11 adjustable parameters], Erase, Crop, Resize, Protect, Image Rotate, Red-Eye Removal, PhotoBook Assist), image search modes (Date, Face, Favourites, Type Of Data, Upload Mark), auto playback (with fade), multi-image playback, 4/9/100 thumbnail displays, zoom playback, silent mode, built-in Wi-Fi module, PictBridge and DPOF support.
**Power:** One 7.2 volt/1260 mAh rechargeable lithium-ion battery pack (NP-W126 type).
**Dimensions (WxHxD):** body only = 129.0x89.8x46.7 mm.
**Weight:** body only = 390 grams (without battery or memory card).
**Price:** $1699 body only.
**Distributor:** Fujifilm Australia, telephone (02) 9466 2600 or visit **www.fujifilm.com.au**

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# THE RIGHT SOLUTION

**Nic Peasley, CEO of Ted's Camera Stores, explains why specialty imaging retailers are a valuable resource for photo enthusiasts and, in particular, how Ted's is working to enhance the retail 'experience'.**

***How important is it for photo enthusiasts to shop at a speciality store for their cameras and other equipment?***
**Nic Peasley:** It's critical in terms of the incredible range that specialist imaging retailers carry, but more importantly, the staff are the most qualified and well-educated people in terms of providing the right advice on what is the best product plus making sure that the experience is one of great service.

***How much emphasis does Ted's place on continuous staff training?***
**N.P.:** Our training programs are extensive covering the three key areas of product knowledge, service and selling. Our point of difference in such a price driven market is our staff, their knowledge and ability to deliver the right solution for our customers in the most professional way. Our training programs are internally driven and ensure that we strive for a level of service and knowledge that is consistent across all stores and staff.

***Is it important that Ted's sales staff be photo enthusiasts as well?***
**N.P.:** It's important, certainly but not essential. We search for great people who love retail. We want staff who have a love for photography or a desire to learn and compliment their service and sales skills. Our training certainly ensures that the photographic knowledge required to deliver the best possible experience is there across all staff.

***Are buying patterns changing? For example, compact system cameras versus D-SLRs.***
**N.P.:** Yes, compact system cameras have experienced massive growth within our business. We have always been early adopters of new products and CSCs are no different. There has been some erosion of the D-SLR category within our business as a result, however new products coming through in D-SLRs plus our commitment to the best lens range possible has sustained it as still our leading product category.

***There seems to be a growing interest in prime lenses – especially in the mirrorless systems – is this demand evident at the retail level?***
**N.P.:** Absolutely. People are continually looking to do better things with better quality products and the widening lens ranges in both CSC and D-SLR provide that opportunity. The lens category as a whole is possibly our most exciting right now as growth opportunities exist in both CSC and D-SLR lens sales on the back of people searching for that next better image.

***It's obviously important for retailers to have an online presence these days, but is there still real value to be had from visiting a 'bricks and mortar' store and talking to real people?***
**N.P.:** Our stores and our people are the core of the Ted's brand. Our online business has grown dramatically over the past four years though and, importantly, also provides a fantastic source of information for Ted's customers who then shop in store. The two really are reliant upon each other and as we move forward we expect that pattern of click and collect to grow. The ability to also provide telephone support to the Website using qualified and experienced Ted's staff supports the Expert position online as well as it does in store as replicating the Ted's experience online is very important.

***What strategies does Ted's employ to maintain an ongoing relationship with customers (i.e. beyond a single purchase)?***
**N.P.:** We have focussed our efforts at growing our ClubTed database and subsequently developing a CRM platform and strategy that rewards those Ted's Customers/ members. Regular and relevant communication to the membership tailored to their specific interests and product choices means that we continue to engage with our customers and hopefully maintain the relationship beyond the first purchase. This will become more critical for specialists as we fight the price only retailers into the future.

***Is it important for a photo retailer to be involved in education programs for customers?***
**N.P.:** It is most definitely a valuable offering in terms of customer retention and also delivering on the complete expectation of a Specialist Photo Retailer. While we have taken some time to get our Teducated program up and running in most states, we have seen fantastic feedback on its value to our customers and we believe it serves a vital role in keeping consumers interested in photography and broadening their image capture gear.

***Retailing in general have been facing tough conditions in Australia, is the future looking brighter?***
**N.P.:**It's been an interesting last two years, but with the growth in CSC and lens attachment we believe that a resurgence in photography will follow. People's desire to take the next better image or do special things with their images is seeing growth in higher end products and also an expectation that top image capture is within reach of the amateur. While retail in general will see mixed conditions over the coming months, we expect our business to maintain strength and market share in the mid-to-higher end through product development and also through our positioning in a tough competitive market.

A CAMERA HANDBOOK &
FUJIFILM AUSTRALIA PROMOTION

# FUJIFILM'S X FACTOR

## FIXED LENS AND MIRRORLESS CAMERAS FOR THE DISCERNING PHOTOGRAPHER

**Fujifilm** unveiled the original X100 compact camera at the 2010 Photokina – and digital photography was changed forever. No other digital camera has created quite such a sensation, and the first of the Fujifilm X Series cameras went on to gain a cult following, as have its successors, including the current X100T (below).

There's now a whole line-up of Fujifilm X Series cameras, and they all embody the same philosophy of providing photographers with the tools to effortlessly and efficient achieve their creative goals. The Fujifilm X Series cameras blend all the best elements of traditional design and ergonomics with the very latest in digital technology, including important innovations such as the exceptional X Trans CMOS sensors.


## FUJIFILM X100T

The X100T maintains all the key ingredients of Fujifilm's original recipe tasty recipe for the revolutionary X100, including a clever hybrid optical/electronic viewfinder, a high-quality fixed prime lens and an all-metal bodyshell that's unashamedly retro-looking in its styling.

The Advanced Hybrid Viewfinder provides the choice of a fully electronic viewfinder (EVF) display or an optical finder with digital read-outs, but also has a third display option, called the Electronic Rangefinder. This is still essentially optical, but in addition to the read-outs, there's a small panel – projected from the EVF – in the lower right-hand corner of the finder and this shows either the Digital Split Image rangefinder or the magnified image section that's used in the EVF to assist with manual focusing. The focus peaking display can also be shown and, when shooting video, the video image itself. This brings all the conveniences of an electronic viewfinder to the reality of an optical finder.

The X100T has Fuji-film's 'X-Trans CMOS II' sensor which is design to eliminate the need for a low-pass filter. It also incorporates embedded sensor arrays to enable fast phase-difference detection autofocusing. The EXR Processor II enables, among other things, continuous shooting at up to 5.8 fps with continuous AF, and Full HD video recording at 50 fps with progressive scanning.

With its classical styling and traditional, dial-based controls, the X100T is still unsurpassed as a camera experience, from the visual to the tactile. It looks right, feels right and works just the way you think it should. The extra capabilities of the hybrid viewfinder further improve its functionality, adding to both the enjoyment factor and the useability.

## FUJIFILM X-T1

The SLR-style weather-proofed all-metal X-T1 uses traditional dial-based control and a state-of-the-art built-in 2.36-megadot OLED viewfinder – at 0.77x, one of the highest magnifications available. Inside, the X-Trans CMOS II sensor and EXR II processor enable continuous shooting up to 8.0 fps with continuous AF and subject tracking. Compact dimensions, a rugged exterior, intuitive controls all combine to make Fujifilm's X-T1 a compelling argument for making the switch from a D-SLR.


## FUJIFILM X-E2

From its classically cool styling to its high-performance X Trans CMOS II sensor, the Fujifilm X-E2 is the complete package for the discerning photographer who wants a compact camera without sacrificing any capabilities… or performance. Additionally, with a choice of over 15 Fujinon X Mount interchangeable lenses, the X-E2 represents a hugely flexible option as well. The X-Trans CMOS II sensor incorporates dedicated pixel arrays for phase-difference detection auto-focusing, delivering enhanced speed and accuracy. But for those who like to focus manually, there's Fujifilm's clever 'Digital Split Image', the 21st century version of the classic split-image rangefinder. The Fujifilm X-E2 delivers classically-inspired enjoyment factor and almost seamless merging of its traditional controls with its contemporary features and capabilities.

## FUJIFILM X30

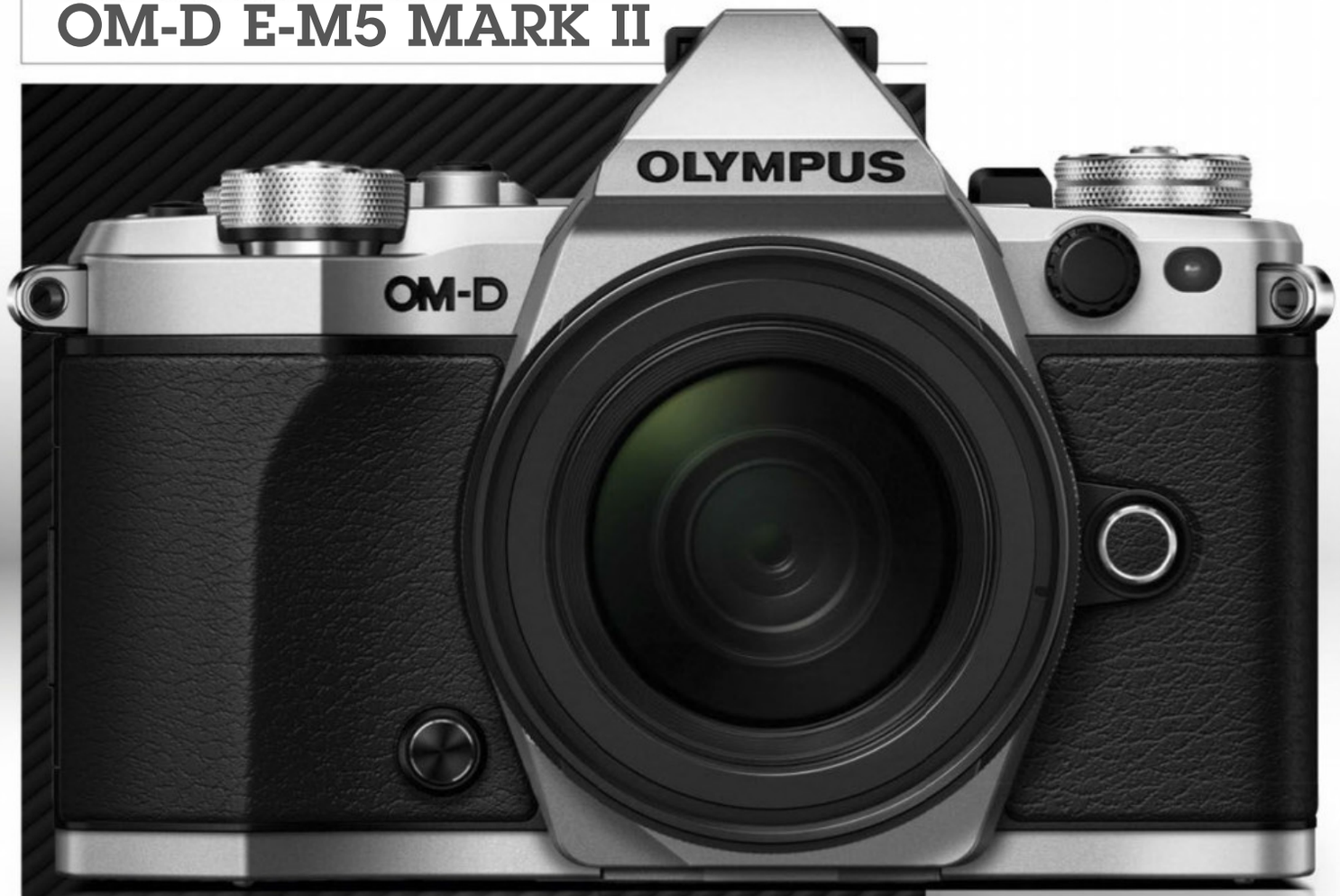
The X30 is the third generation version of Fujifilm's fixed-lens X Series top-of-the-range compact camera. It combines a 12 megapixels 'X-Trans II' CMOS sensor with a versatile 28-112mm (35mm equivalent) f2.0-2.8 zoom lens. The classically-styled body is an all-metal design with a large 7.62 cm monitor that's adjustable for tilt, but importantly the X30 also has a fully electronic OLED-type viewfinder with 2.36 megadots resolution.

Easy operation is made possible via a multi-function control collar set around the lens which can be set to make a variety of adjustments.. The X30's EVF provide 100 percent scene coverage and replicates all the monitor's displays so, very usefully, it can be used for previewing capture settings such as the white balance or the 'Film Simulation' picture presets. Other notable features include an intervalometer for shooting time-lapse sequences of up to 999 frames, WiFi connectivity which allows for both wireless file transfer and remote camera control (via the Fujifilm Camera Remote app), direct printing to an Instax instant print device, and a stereo audio input. The Fujifilm X30 represents a highly desirable combination of size, capabilities and affordability.


For more information about Fujifilm X Series cameras visit **www.fujifilm.com.au**

REPORT BY **PAUL BURROWS**

# OLYMPUS
## OM-D E-M5 MARK II




# THE LITTLE CAMERA THAT ROARED

**Spearheaded by the original E-M5, Olympus's OM-D system has become dominant in the mirrorless category, and the much-enhanced Mark II model is going to give it an even greater presence.**

If ever there's a case of history repeating, it's the stories of Olympus's OM and OM-D systems. Separated by 40 years, they have both had pretty much the same effect on the market. Back in 1972, Olympus was nowhere in 35mm SLRs, but after the arrival of the revolutionary OM-1 and OM-2, it became a major player.

In 2012 Olympus wasn't quite nowhere in the emerging category of mirrorless interchangeable lens cameras because it had enjoyed reasonable success with the Digital Pen series, but it was the OM-D cameras that really put the brand back on top of its game… and the sales charts. While the OM-D models have very successfully channelled the key attractions of their analog namesakes – compact dimensions, oh-so-pretty styling and no-nonsense operation – Olympus hasn't neglected the other key elements, namely high-quality lenses, a good system of accessories and, perhaps

most importantly, desirability born out of creating an appealing image… essential as plenty of today's buyers weren't actually around when the OM legend was being forged. Things move a lot quicker now in the camera world than they did 40 years ago so we've come quite a long way in the three years since the E-M5 made its debut, especially in terms of developments in mirrorless designs. Models like the E-M1 have had serious implications for the D-SLR market, but the OM-D system collectively has helped legitimise the category, converting dyed-in-the-wool traditionalists who would have once never contemplated using anything other than a reflex. Not surprisingly then, the E-M5 Mark II is a very different camera to its predecessor, almost to the point that it probably warranted a new model number, but then Olympus is probably quite keen for Mk.I owners to upgrade (as an aside, it would have been fun to call it the E-M5N, following the old OM numbering method for updated models, although this suffix isn't quite as obvious as Mark II).

## CHANNELING OM

While it's even more traditional-looking on the outside – and, consequently, even more OM-like – on the inside, the E-M5 II leverages the current digital imaging technologies to deliver new capabilities and increased performance in a number of areas.

For the first time, Olympus is actively pursuing the video-maker and although the E-M5 II isn't in the same league as Panasonic's GH4 in this regard, it's the next best thing in the Micro Four Thirds format (i.e. without going to a dedicated video camera). But the still photographer has plenty to be pleased about too, not the least being a multi-shot capture function that yields a 40 megapixels JPEG image or a 64 MP RAW file (more about this shortly).

Styling-wise, the E-M5 II has a more 'pointy' housing for its electronic viewfinder which is very reminiscent of the pentaprism housing on the OM-1 and OM-2. The lever-type on/off switch is borrowed straight from the OM-1 (it's also reprised on the E-M1) and is located in exactly the same position on the top deck. The main mode dial now has a locking button – which you can choose to use or not – while the front and rear input wheels – now looking more dial-like than ever – have been downsized and relocated almost in tandem rather than side-by-side. This has freed up space for two more customisable buttons, namely 'Fn3' and 'Fn4' which default, respectively, to manual EVF/monitor switching and engaging HDR capture. On the rear panel is another analog-era lever – again borrowed from the E-M1 – which quickly switches the operations of the input wheels between exposure control (i.e. program shift/apertures/shutter speeds and exposure compensation) and ISO/white balance setting. You can also switch around which wheel does what. It's a neat little arrangement which works really well in practice, essentially making four different functions accessible via the flick of a switch.

Perhaps more interestingly on the rear, the monitor screen now


> THE OM-D SYSTEM COLLECTIVELY HAS HELPED LEGITIMISE THE MIRRORLESS CATEGORY, CONVERTING DYED-IN-THE-WOOL TRADITIONALISTS WHO WOULD HAVE ONCE NEVER CONTEMPLATED USING ANYTHING OTHER THAN A REFLEX.


has full tilt-and-swing adjustability so it can also be folded away with the faceplate inwards for protection. The panel itself is now a TFT LCD screen – but still 7.62 cm in size – with an increased resolution of 1.037 million dots and capacitance-type touch control. The EVF is inherited from the E-M1 which means, compared to the E-M5, it steps up to a resolution of 2.36 million dots and a magnification of 1.48x. This also means it's exceptionally good, exhibiting excellent clarity, contrast and colour with no traces of lag even with rapid panning (Olympus says the latency is now down to 10 milliseconds). The in-built Proximity sensors on the eyepiece enable automatic switching between EVF and monitor.

On the front panel, the E-M5 II sports a reshaped handgrip and, on the other side of the lens mount, a PC flash terminal. As before, there isn't a built-in flash, but the camera is supplied with a very nifty little accessory unit which, despite its smallness, has a bounce-and-swivel head. It's powered from the camera body via an extra contact in the hotshoe which, incidentally, no longer has an accessory port at its rear… simply because the E-M5 II now has all these 'extras' built-in, including WiFi and a stereo audio input.

The bodyshell comprises magnesium alloy covers and is fully sealed against the intrusion of dust or moisture… which Olympus has been able to maintain even with the side-mounted monitor screen. Additionally, there's now insulation which allows for operation in temperatures down to -10 degrees Celsius.

The changes to the control layout as well as subtle revisions to the styling make for a much more cohesive look overall and the new E-M5 easily matches Fujifilm's X-T1 for sheer visual appeal.

## FIVE STOPS 'IS' CORRECTION… & 40 MP!

The inside story is also a good one. The sensor is a redesigned version of the 17.2 megapixels 'Live MOS' imager used in the previous model (and the E-M10), but the E-M5 II matches it with the E-M1's powerful 'TruPic VII' processor which drives a number of performance enhancements for both still photography and video recording. For example, the maximum continuous shooting speed is now 10 fps with the AF/AE locked to the first frame and 5.0 fps with AF/AE adjustment between frames. The sensitivity range is equivalent to ISO 200 to 25,600 with a one stop 'pull' to ISO 100.

Like the E-M1, the E-M5 II has five-axis image stabilisation via sensor shifting, but it's actually a whole new system re-engineered for greater precision of operation, particularly with hand-held video shooting applications in mind. The amount of correction for camera shake is increased to five stops and it's possible to hand-hold at much slower shutter speeds, down to around ¼ second (which usually defeats a conventional IS system). Tellingly, Olympus now includes image stabilisation as one of the key components for obtaining optimum picture quality, especially when shooting close-ups or using a telephoto lens. There's a choice of modes for panning or the system can be left to detect the

### HIGH RES SHOT CAPTURE

**This new function** uses sub-pixel sensor shifting to take eight exposures which are subsequently combined in-camera to give 40 megapixel JPEGs (or 64 MP RAW files). The camera and subject have to be completely static so the feature is restricted in terms of the possible applications, but the level of detailing is just exceptional, matching that obtained from an ultra-high res full-35mm sensor. A 100 percent crop from the same scene shot at 16 MP (JPEG/large/superfine) is shown alongside for comparison (left). A key difference here is the depth-of-field as 'High Res Shot' won't allow an aperture smaller than f8.0 whereas the 16 MP image was shot at f14. To maximise the depth-of-field at f8, it's going to be necessary to focus manually and delve into the mysteries of the hyperfocal distance!

camera movement and set the appropriate mode automatically.

Just how precise the new IS system is can be gauged from a new spin-off feature called 'High Res Shot' which works in the same way as the multi-shot capture found on some digital medium format systems. A series of eight images are captured in sequence, taking roughly a second with the sensor shifted in one-pixel increments for the first four – so that all colours are captured at each position, cancelling out the


The 'Highlight & Shadow Control' is a simplified Curves-style adjustment for individually controlling the brightness of the highlights and/or the shadows.



The live view display options (also available in the viewfinder) include a dual-axis level indicator, grid guides and a real-time histogram. The green section within the histogram shows the brightness values within the selected focusing point or cluster of points.


Focus assist is provided by a magnified image (up to 14x) and a focus peaking display (with a choice of four colours and three levels of intensity).


**Olympus freely** admits that video hasn't been a priority on its OM-D cameras to date, but perhaps watching the success that MFT rival Panasonic is having with the Lumix GH4 (and the GH3 previously) has convinced it to go after these users. Consequently, Olympus go from just dabbling to being really serious, and the E-M5 Mark II gets pretty well everything needed to compete with the big guns in this sector. As noted in the main text, it's not quite in the same league as an enthusiast/pro video camera as the hugely capable GH4, but it's still got a whole lot going for it here.

Obviously the five-axis image stabiliser underpins an impressive suite of video capabilities Olympus is collectively calling "OM-D Movie" on the E-M5 II. The ability to shoot smoothly when the camera is hand-held is a key selling point – 'run and gun' in video parlance – and the demos here are impressive with the footage looking stable enough to have been shot with a dolly or jib. There's the option using just the sensor-shift or combining it with electronic stabilisation (made possible by a small crop of the sensor image prior to downsampling). And, of course, it works with any lens which is important in the video world where camera bodies – especially with the MFT mount – are being used with all sorts of glass, ancient and modern… given manual diaphragm control and focusing is often more desirable. That said, the refinements to the E-M5 II's AF system also have benefits here, particularly in terms of response speeds and the smoothness of the continuous AF.

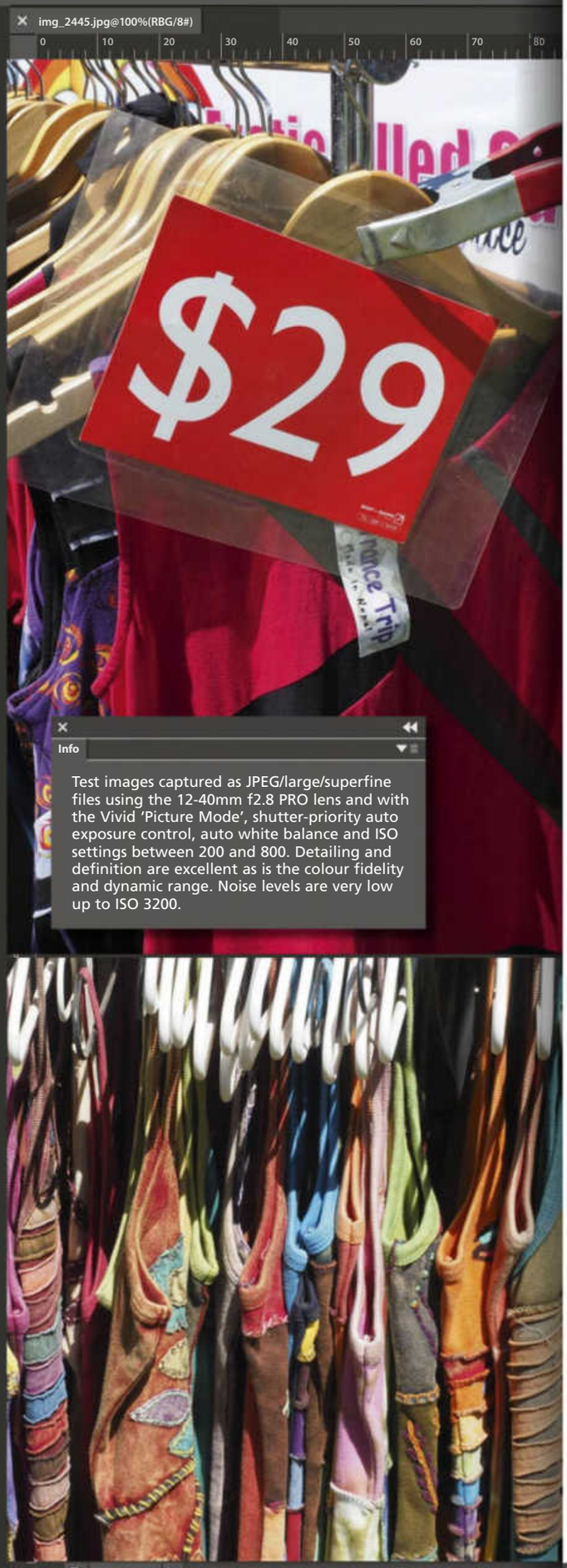
Full HD shooting is available at all frame rates (in all regions) with progressive scan – 60 fps, 50 fps, 30 fps, 25 fps and, crucially, 24 fps – with the option of All-Intra intraframe or IPB interframe compressions regimes (although All-I is only available with the three slower speeds when shooting at FHD). All-I compression optimises image quality – and is really the only option is you're planning to do a lot of editing – while IPB delivers smaller, more manageable files. With All-I compression, the bit rate is an impressive 77 Mbps and when using IPB it's still a very acceptable 52 Mbps. Importantly, an uncompressed and 'clean' video feed (8-bit, 4:2:2 colour and 24 fps, 25 fps or 30 fps) is available at the camera's HDMI terminal for recording to external devices. However, it's not possible to simultaneously record compressed video to the memory card which is a bit of a disappointment. Unlike the GH4, the E-M5 II doesn't shoot at 4K, but for many users – even pros – this isn't an issue… at least not yet.

The E-M5 II has built-in stereo microphones, but there's also a stereo audio input and provisions for manually controlling the recording levels. The optional HLD-8G handgrip has a stereo audio output for connecting headphones for monitoring purposes. This is a compact device so it doesn't compromise the camera's overall smallness, but you can subsequently then fit the HLD-6P battery holder – which houses an additional li-ion pack and also serves as a vertical grip – if endurance is a more critical requirement. There's also a volume limiter and a switchable wind noise filter.

The monitor screen's full range of adjustments also have benefits when shooting video as does the availability of touch controls for functions including AF point selection and focusing, exposure, audio recording levels, headphone levels and power zooming (when a supporting lens is fitted). Obviously all these touch-control adjustments are made silently. In this regard, the sensor shutter also gets a big tick. The exposure mode is first set via the Movie Menu, and then the aperture, shutter speed or ISO can be selected via a tabbed 'pull-out' menu and adjusted during recording via up/down sliders (or the rear input wheel). The trick here is to use a light touch, otherwise a slight vibration can be visible in the footage (even with the IS operating).

Usefully, the focus peaking display is now available when shooting video (with the same choice of four colours and three intensities as for stills) and there's a real-time histogram which also remains on-screen when shooting (whereas the highlight and shadow warnings don't). The grid guides are also available. You can apply most of the 'Art Filter' effects. Additionally, there's a choice of five 'Movie Effect' settings called Art Fade, Old Film, Multi Echo, One Shot Echo, Multi Teleconverter. The E-M5 II can also add time-coding to footage and provides a seamless transition to a new file when the 4.0 GB limit is reached.

Not too many other CSCs are this well-equipped in terms of their video capabilities so the E-M5 II joins a very elite club with the GH4, Sony's A7S and the Samsung NX-1. And that little bit of Olympus magic might just make it the pick of the pack here too.




effects of the Bayer pattern filter – and half-pixel increments for the next four. The eight exposures are then combined in-camera which takes a couple of seconds to complete. The end result is either a 40 megapixels (7296x5472 pixels) JPEG or a 64 megapixels (9216x6912 pixels) RAW file (which is about 100 MB in size).

Of course, a prerequisite is that both the camera and the subject be totally static, but for subjects such as landscapes, architecture or still life set-ups, this shouldn't be too much of an issue. As the IS system is disabled to enable the High Res shift, the camera just has to be mounted on a tripod; hand-held shooting isn't an option.

In addition to the massive increase in resolution, the combined multiple exposures significantly reduce noise (the maximum ISO available for this mode is 1600) and also moiré patterns. It's not a new idea, but it's the first time it's been done on a small format camera and, as has happened with a number of pioneering ideas from Olympus (active dust reduction, remember), it's likely that everybody will follow suit. Obviously too, it's one way, albeit slightly compromised, for MFT and 'APS-C' format cameras to match the big pixel counts of full-35mm sensors.

'High Res Shot' uses a sensor-based shutter to make the exposures and this is another new feature on the E-M5 II, enabling totally silent operation when shooting normally and also giving a faster top speed of 1/16,000 second and a continuous shooting rate of 11 fps. A conventional focal-plane shutter is retained and has a speed range of 60-1/8000 second with a 'B' setting which allows for a maximum duration of 30 minutes.

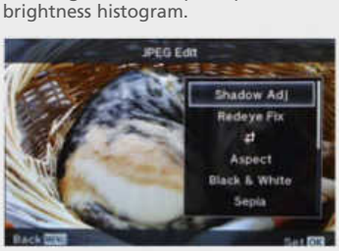
## LIGHT AND SHADE

Exposure control is based on the 324-point 'Digital ESP' multi-zone metering currently in service across the OM-D range. There are options of centre-weighted average or spot measurements, the latter maintaining the Olympus tradition of being adjustable for either the highlights or the shadows. The main 'PAS' auto exposure control modes are backed by an AE lock, up to +/-5.0 EV of compensation and auto bracketing which can be applied over sequences of two, three, five or seven frames with adjustments of +/-0.3, 0.7 or 1.0 EV. Incidentally, all the exposure-related adjustments can be preset to be made in one of these three increments.


Menu system is largely unchanged from the previous model so the Shooting Menu (top) is short and sweet and the Custom Menu (above) is terrifyingly long.




Image review/replay screen options include a thumbnail with a full set of histograms or a superimposed brightness histogram.




A range of in-camera editing functions are provided, including RAW-to-JPEG conversion.

There's a choice of 25 subject/scene modes with automatic scene selection in the camera's 'iAUTO' full-auto mode. While 'iAUTO' can be entirely point-and-shoot, there's a series of basic manual overrides called 'Live Guides' These are accessed via a touch tab on the monitor display and provide some control over colour saturation, colour balance, brightness, background blur and the blurring/freezing of moving subjects. The adjustments are applied via touch-operated slider-type controls.

As on the previous model, there's a selection of six 'Picture Mode' presets called i-Enhance, Vivid, Natural, Muted, Portrait and Monotone. The i-Enhance

**STYLING-WISE, THE E-M5 MARK II HAS A MORE 'POINTY' HOUSING FOR ITS ELECTRONIC VIEWFINDER WHICH IS VERY REMINISCENT OF THE PENTAPRISM HOUSING ON THE OM-1 AND OM-2.**

preset boosts the saturation of whatever colour predominates in a scene and also adjusts the dynamic range. Each colour 'Picture Mode' has adjustable parameters for sharpness, contrast, colour saturation and tonal gradation which, in turn, has sub-settings called Normal, Auto, High Key and Low Key. The Monotone 'Picture Mode' replaces the saturation adjustment with a set of contrast control filters (yellow, orange, red and green) and a choice of toning effects (sepia, blue, purple or green). There is a provision for creating one user-defined colour 'Picture Mode'.

Additionally, there's a simplified Curves-style adjustment for individually controlling the brightness of the highlights and/or the shadows. With the 'Highlight & Shadow Control' activated, the front dial adjusts the highlights while the rear dial adjusts the shadows. Similarly, there's a 'Colour Creator' control which also works like a Photoshop function – the Saturation/Hue adjustment – with the front dial adjusting the hue and the rear dial the saturation

## TAKING EFFECT

After starting out tentatively with in-camera filter effects, Olympus now embraces them as wholeheartedly as anybody and the E-M5 II has a total of 14 'Art Filter' special effects, most of which are adjustable. Additionally, these can be combined with a number of 'Art Effects' and there's a bracketing function which allows for every effect – and the 'Picture Modes' – to be included in the sequence so there's the possibility of having a total of 21 variations of an image.

Additional image processing functions are borrowed from the E-M1, namely an intervalometer for creating time-lapse sequences and a multi-shot HDR function. The intervalometer allows for up to 999 frames to be recorded at intervals of up to 24 hours. The HDR function has two auto modes which capture four frames at two different amounts of exposure variation and then combines them into the one image with either "high contrast" or "super-high" contrast. Alternatively, there's a choice of presets – three, five or seven frames at +/-2.0 EV; and either three or five frames at +/-3.0 EV. Multiple exposures – well, actually only double exposures – can be made with the option of an 'Auto Gain' exposure adjustment.

The white balance control options are virtually the same as those provided on the E-M1. The auto correction has a 'Keep Warm Colour' option for use when shooting under tungsten lighting, but this needs to be preset in the custom menu. There are seven presets and provisions for storing up to four custom measurements. All have fine-tuning, set using slider-type controls for the amber-to-blue and green-to-magenta colour ranges. Manual colour temperatures can be selected over a range of 2000 to 14,000 degrees Kelvin. Auto white balance bracketing is performed over a sequence of three frames. As with the other OM-D models, all the auto bracketing functions are collected in one menu and the other options are for exposure, flash and sensitivity as well as the already-mentioned exposure and 'Art Filters'.

## FAST FOCUS

Unlike the E-M1, the E-M5 II employs a conventional contrast-detection autofocusing system, but it has the same number of measuring points – 81, arranged in a 9x9 pattern – which provide pretty extensive coverage across the frame. Additionally, Olympus's 'FAST' (Frequency Accelerated Sensor Technology) processing means speed isn't really an issue even without the extra assistance of a hybrid system.

Point selection can be left to the camera or performed manually with selectivity varied via a choice of two target sizes or a group setting which uses a cluster of nine (3x3) points. Face detection AF can also be fine-tuned to focus on either the left or right eye or whichever one is nearest the camera. Over 800 points are available when using the 'Zoom AF' mode which magnifies the image by 3x (new on this model), 5x, 7x, 10x or 14x.

Switching between single-shot and continuous AF operation is performed manually and Olympus continues to offer a full-time override for the former, and an auto tracking option with the latter. The M.Zuiko Digital PRO lenses – such as the 12-40mm f2.8 which is one of the kit options for the E-M5 II – have a clever push-pull focusing collar which allows for quick and convenient switching between AF and MF control. Manual focusing is assisted by a magnified image (with the same choice of settings) and a focus peaking display which can be set to red, yellow, black or white; and low, normal or high intensity. As an aside, the PRO lenses are also weather-proofed and Olympus has just added a 40-150mm f2.8 to the M.Zuiko Digital line-up (equivalent to 80-300mm). Five weather-proofed lenses are available now with another two to come during 2015, including an 8mm f1.8 fish-eye (which will also be a PRO lens).

## IN CONTROL AND ON DISPLAY

The increased scope for control customisation makes it possible to configure the E-M5 II very precisely to your way of working or the demands of a particular application. This basically takes in-the-field operability away from the menus and onto the external controls which can be set to cover everything you're likely to need. And this is even without using the handy 'Super Control Panel' display in the monitor screen which provides direct access to a wide range of capture settings and can be navigated via touch control or by using either the four-way key pad on the rear panel or the rear input wheel. Adjustments are made via the front wheel.

Alternatively, there's the option of using a 'Live Control' screen which provides the live view image with the function tiles arranged along the left-hand edge of frame and the actual settings along the bottom edge. Usefully, both the 'Super Control Panel' and the 'Live Control' display can be selected for display in the viewfinder as well as the monitor screen.

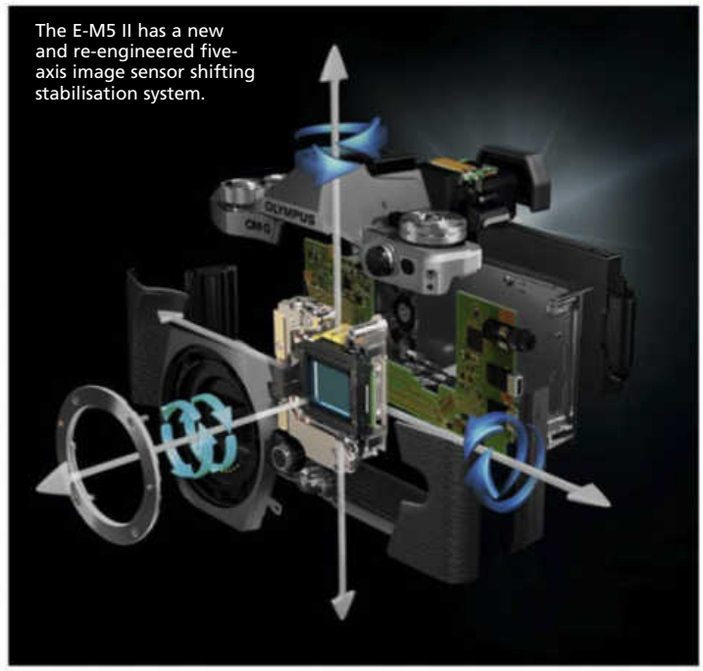
Olympus assumes nothing in terms of how you might like to configure your displays so, if you want these control options, you're going to have to switch them on… and, what's more, this has to be


The monitor screen now has full tilt and swing adjustments so it can be folded away with the faceplate inwards for protection.

done for each of the camera's main operational configurations – i.e. iAUTO, PASM, Art Filters and Scene Modes. This means repeating the procedure four times if you want the control screens to be available all the time. Olympus employs this 'opt in' approach for most aspects of the E-M5 II's operation – all the displays, for example – which means its Custom Menu is one of the most extensive you'll encounter outside of the OM-D family and the full set-up takes a bit of time. That said, absolutely every possible option is provided and you really can pick and choose which elements you want and those you don't.

The review/replay screens can be configured to include a thumbnail image with a full set of histograms (i.e. brightness and RGB channels), a larger brightness histogram superimposed over the image, highlight and shadow warnings and a 'Light Box' display for the side-by-side comparison of two images (complete with zooming which is very handy). The thumbnail pages comprise four, nine, 25 or 100 images plus a calendar display, again all of which has to be switched on in the Custom Menu. Touch controls are available for browsing, zooming and scrolling through the thumbnails. The in-camera editing functions remain the same as before and comprise Shadow Adjust, Red-Eye Fix, Aspect, B&W, Sepia, Saturation, Trimming Resize, e-Portrait and RAW-to-JPEG conversion. The special effects aren't available post-capture.

Setting up the monitor and EVF displays also requires a trip to the Custom Menu with the options being a real-time histogram, dual-axis level indicators, highlight and shadow warnings and a superimposed grid (from a choice of five). Importantly, though, these can now all be combined in the one all-singing, all-dancing display. The highlight and shadow warnings have adjustable thresholds and the real-time histogram includes an internal section – displayed in green – which shows the brightness values within the selected focusing point or cluster of points.


The E-M5 II has a new and re-engineered five-axis image sensor shifting stabilisation system.

## SPEED AND PERFORMANCE

With our reference memory card – Lexar's Professional 600x 64 GB SDXC UHS-I speed device – loaded, the E-M5 Mark II captured a burst of 19 JPEG/large/superfine frames in 1.961 seconds which represents a continuous shooting speed of 9.7fps. This is only a whisker below the quoted 10 fps (using the focal plane shutter) and the test file sizes were around 9.8 MB on average which is quite a lot larger than the 8.4 MB on which Olympus bases its speed measurement. Although it's not really very big, the buffer empties very rapidly indeed, but the camera will go on shooting when it's full, just at a slower frame rate.

Once again, Olympus demonstrates that sensor size and pixel counts aren't necessarily everything and it continues to squeeze more performance out of its MFT 'Live MOS' imager. In the case of the E-M5 II it helps that the optical low pass filter (OLPF) has been removed to help optimise resolution, as is the case with the E-M1. The superfine quality JPEGs are just packed with crisply-defined detailing and super-smooth tonal gradations. Perhaps most surprising is the dynamic range which is wider than might be expected for a 'small' sensor. The colour reproduction is excellent across the spectrum and from the subtlest of shades through to fully saturated tones. The Vivid 'Picture Control' delivers really punchy images that are reminiscent of the best colour transparency films in terms of the saturation, sharpness and contrast. Of course, the PRO series 12-40mm f2.8 zoom lens does its bit here too, delivering an exceptional uniformity of sharpness from centre-to-corner across both its focal range and aperture range. Even at f2.8, the corner sharpness is still extremely good and the light fall-off (i.e. vignetting) minimal.

Noise levels are very low up to ISO 3200 and both the ISO 6400 and 12,800 are still quite usable, but exhibit some graininess in areas of continuous tone while the reduction processing starts to reduce the definition. As we noted with the E-M1, the imaging performance doesn't give anything away to the rival CSCs with a larger 'APS-C' sensor, even the best of them such as Fujifilm's X-T1 or Samsung's NX-1.

And the E-M5 II even has a tilt at cameras with full-35mm sensors via its multi-shot 'High Res Shot' capture mode. It's a little restricted in its usage because the subject has to be absolutely static and the camera (very securely) mounted on a tripod, but in the right situations, the 40 megapixels JPEGs look stunning and very noticeably exhibit much higher levels of fine detailing compared to shooting at 16 MP. As noted earlier, the sub-pixel shifts also have the effect of eliminating moiré patterns even though the Olympus's sensor doesn't have an OPLF. And because HRS is sampling all colours at all pixel positions, the chroma (or colour) resolution is as high as the luminance resolution so colour accuracy is maintained down to pixel- level detailing.

**ONCE AGAIN, OLYMPUS DEMONSTRATES THAT SENSOR SIZE AND PIXEL COUNTS AREN'T NECESSARILY EVERYTHING AND IT CONTINUES TO SQUEEZE MORE PERFORMANCE OUT OF ITS MFT 'LIVE MOS' IMAGER.**

## THE VERDICT

After we'd reviewed the E-M10 we reckoned it was pretty much the pick of the OM-D litter because, even though it was the entry-level model, it represented an irresistible combination of compactness, capabilities and affordability.

Now Olympus has put quite a lot of the E-M1 – and more – into an E-M5 sized body, there's a new value-for-money hero in the line-up. And the E-M5 II is prettier yet again. But this camera's beauty is more than skin deep. Olympus has given it some serious brains too – the uprated image stabiliser, the 40 MP capture mode, the 81-point AF, the significantly better EVF and the pro-level video capabilities. Then there's the improved handling and operational efficiency (much improved in the case of the latter), the tilt/swing monitor, the more generous accessory flash.

Finally, Olympus has sprinkled it with the fairy dust that made the original OM cameras so desirable and which it has obviously rediscovered for the OM-D era. It's that indefinable 'something' which creates a camera you just can't resist picking up and actually using. It all adds up to something rather special and the E-M5 Mark II has it in spades.


M.Zuiko Digital PRO series lenses are weatherproofed to match the E-M5 II body.

## VITAL STATISTICS

# OLYMPUS OM-D E-M5 MARK II $1499

with M.Zuiko Digital ED 12-50mm f3.5-6.3 EZ zoom lens

Type: Fully automatic, interchangeable lens digital camera with Micro Four Thirds System bayonet lens mount.
Focusing: Automatic 81-point wide-area system using contrast-detection measurement via imaging sensor. Focus points may be selected manually or automatically by the camera. Manual switching between one-shot and continuous AF modes. Face/eye detection and auto tracking. Continuous manual override available with single-shot mode. Low light/contrast assist via built-in illuminators. Focus assist via magnified image (3x/5x/7x/10x/14x) and focus peaking display (Red, Yellow, White or Black; High, Normal or Low intensity).
Metering: 324-point 'Digital ESP' (i.e. multi-zone), centre-weighted average, spot (2.0%) with highlight/shadow bias, and TTL flash. Metering range is EV -2.0 to 20 (ISO 100/f2.8).
Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, TTL auto flash and TTL flash. Plus 25 subject/scene programs. Automatic scene detection in 'iAUTO' mode.
Shutter: Electronic, vertical travel, metal blades, 60-1/8000 second plus B (up to 30 minutes). Flash sync to 1/250 second. Exposure compensation up to +/-5.0 EV in 1/3, ½ or full stop increments. Alternative sensor shutter has a speed range of 60-16,000 second.
Viewfinder: EVF with 2.36 megadots resolution, 100 percent coverage and 1.48x magnification, or variable-angle 7.62 cm TFT LCD monitor screen (1.037 megadots) with touch screen controls. Both have scale/grid, histogram and info displays plus a zoom function. Auto/manual switching between EVF and monitor screen.
Flash: No built-in flash. External flash units connect via hotshoe or PC terminal. Compact FL-LM3 accessory flash unit (with tilt/swivel head) supplied; GN 9.1 (ISO 200) and 12mm coverage (i.e. equivalent to 24mm). Auto, fill-in, red-eye reduction, slow-speed sync, second curtain sync and wireless commander modes.
Additional Features: Magnesium alloy bodyshell sealed against dust and moisture, AE/AF lock, auto exposure bracketing, depth-of-field preview, programmable self-timer (variable delays, intervals and number of frames), audible signals, auto power-off, wired remote triggering, wireless remote control via WiFi.

### DIGITAL SECTION

Sensor: 17.2 million (total) pixels Live MOS with 17.3x13.0 mm imaging area and 4:3 aspect ratio. Sensitivity equivalent to ISO 200-25,600 (extendable to ISO 100). No optical low pass filter.
Focal Length Magnification: 1.97x.
Formats/Resolution: Four JPEG compression settings, RAW output (lossless compression) and RAW+JPEG capture. Eight resolution settings (four set at any one time) at 4:3 aspect ratio; 4608x3456, 3200x2400, 2560x1920, 1920x1440, 1600x1200, 1280x960, 1024x768 and 640x480 pixels. Eight resolution settings (four set at any one time) at 3:2 aspect ratio; 4608x3072, 3216x2144, 2544x1696, 1920x1280, 1584x1056, 1296x864, 1008x672 and 624x416 pixels. Eight resolution settings (four set at any one time) at 16:9 aspect ratio; 4608x2592, 3200x1800, 2560x1440, 1920x1080, 1536x864, 1280x720, 1024x576 and 640x360 pixels. Eight resolution settings (four set at any one time) at 1:1 aspect ratio; 3456x3456, 2400x2400, 1920x1920, 1440x1440, 1216x1216, 960x960, 768x768 and 480x480 pixels. 24-bit RGB colour for JPEGs, 36-bit RGB colour for RAW files. RAW files captured at 4608x3456 pixels. In 'High Res Shot' mode; JPEG = 7296x5472 pixels and RAW = 9216x6912 pixels.
Video Recording: Full HD at 1920x1080 pixels at 60 fps, 50 fps, 30 fps, 25 fps or 24 fps and 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression (77 Mbps with All-Intra compression regime, 52 Mbps with IPB compression). Fine or normal quality modes. HD at 1280x720 pixels, 25 fps and 16:9 aspect ratio, AVI format with Motion JPEG compression. Built-in stereo microphones with wind filter, and 3.5 mm stereo audio input. Auto/manual sound level adjustment. Microphone volume limiter. Maximum recording time is 29 minutes and 59 seconds, but a new file is automatically started when the 4.0 GB size limit is reached. Movie clips limited to 2.0 GB file size in AVI.
Video Features: Five 'Movie Effect' settings (Art Fade, Old Film, Multi Echo, One Shot Echo, Multi Teleconverter), 'Art Filter' effects, 'My Clips' function, touch screen controls, time code support, time lapse recording (AVI Motion JPEG, 1280×720 pixels,10 fps), uncompressed 8-bit 4:2:2 output via HDMI connection.
Recording Media: SD/SDHC/SDXC memory cards with UHS-I and UHS-II support.
Continuous Still Shooting: Up to 19 frames at 10.0 fps in JPEG/large/superfine mode with AF/AE locked to the first frame, up to 16 frames in RAW mode. Unlimited frames (JPEG or RAW) at 5.0 fps with continuous AF/AE adjustment. Anti-Shock and Silent modes available when shooting at the 5.0 fps speed. Continuous shooting at 11 fps with the sensor shutter, AF/AE locked to the first frame.
White Balance: TTL measurement via image sensor. Auto measurement, auto warm, seven presets and four custom settings. White balance compensation (amber-to-blue and/or green-to-magenta) in all presets plus white balance bracketing over three frames. Manual colour temperature setting from 2000 to 14,000 degrees Kelvin.
Interfaces: Multi-connector (USB 2.0 and NTSC/PAL composite video), micro HDMI (Type D) and 3.5 mm stereo audio input.
Additional Digital Features: Built-in five-axes image stabilisation (with vertical and horizontal only modes, and auto panning detection), built-in sensor cleaning, Adobe RGB and sRGB colour spaces, long exposure noise reduction (Auto, On, Off), high ISO noise filter (Off, Low, Standard, High), six 'Picture Modes' (i-Enhance, Vivid, Natural, Muted, Portrait and Monotone), one user-defined 'Picture Mode', adjustable 'Picture Mode' adjustments (Contrast, Sharpness, Saturation and Gradation – Auto, Normal, Low-Key, High-Key), Monochrome mode has four contrast filters and four toning effects, 'Colour Creator' function, 'Highlights & Shadows' control, 14 'Art Filter' effects applied at capture (Pop Art, Soft Focus, Pale & Light Colour, Light Tone, Grainy Film, Pin Hole, Diorama, Cross Process, Gentle Sepia, Dramatic Tone, Key Line, Watercolour, Vintage, Partial Colour), 'Art Filter' bracketing, nine 'Art Effects' (Soft Focus, Pin Hole, White Edge, Frame, Starlight, Top And Bottom Blur, Left And Right Blur, Filter, Shade Effect), multi-shot HDR capture (two auto settings, five manual settings), 'High Res Shot' capture (pixel shift gives 40 MP image from eight combined images), 'Photo Story' function (Standard, Fun Frame, Speed, Zoom In, Layout), 'Live Composite' mode, multiple exposure facility (with auto exposure adjustment), intervalometer (up to 999 frames), auto bracketing modes (AE, WB, ISO, flash and 'Art Filters'), 'sweep' panorama mode, 'Super Control Panel' screen, dual-axis level display, real-time histogram display, guide grids (choice of five), highlight and shadow alerts (adjustable thresholds via histogram), adjustable image display time, auto image rotation, slide show (with a choice of music and transitions), playback zoom (up to 14x), 4/9/25/100/Calendar thumbnail displays (also available in slide show mode), 'Lightbox' side-by-side comparison display, in-camera editing functions (Gradation, Red-Eye Fix, Aspect, B&W, Sepia, Saturation, e-Portrait, Resize, Trimming, Overlay), in-camera RAW-to-JPEG conversion, in-camera RAW image overlay, copyright info, DPOF and PictBridge support, built-in WiFi module for remote camera control and wireless image transfer.
Power: One 7.6 volt/1220 mAh rechargeable lithium-ion battery pack (BLN-1 type). Optional HLD-8 battery grip accepts an additional BLN-1 pack.
Dimensions (WxHxD): body only = 123.7x85.0x44.5 mm.
Weight: body only = 417 grams (without battery pack or memory card).
Price: Body only = $1299. $1499 with M.Zuiko Digital ED 12-50mm f3.5-6.3 EZ zoom or $2099 with M.Zuiko Digital PRO 12-40mm f2.8 zoom.
Distributor: Olympus Imaging Australia Pty Ltd, telephone 1300 659 678, or visit the website at www.olympus.com.au

REPORT BY PAUL BURROWS

# LEICA Q


# ON THE BALL

**If the T is the camera Leica had to build, the Q is the one it simply couldn't resist building… if only to show everybody else how it's done.**

Probably after reading yet another observation along the lines of "… this is the camera Leica should have made" – usually in a review of one of Fujifilm's X100 models – the Germans decided to go ahead and do their own *proper* fixed-lens, big sensor, retro-styled model. It's not quite a case of anything-you-can-do-we-can-do-better, but let's face it, if anybody has real legitimacy in this space, it's Leica. Despite its heritage being in interchangeable lens cameras, when the technological stars all eventually aligned, Leica was always going to build something like the Q.

Think of it as a digital M with a fixed prime lens and an electronic viewfinder – costing considerably less than going down the interchangeable lens route –

and you can start to see the appeal. And Leica has specified the key components very carefully so the Q has a full-35mm CMOS sensor *sans* optical low pass filter to optimise its 26.3 megapixels resolution. The lens has a focal length of 28mm – not dubbed 'the cinematic focal length' for nothing – and a fast maximum aperture of f1.7. The EVF resets the bar for image quality… and is probably one of the main reasons why the time is now right for the Q. Above all else, it's a genuine Made-In-Germany Leica camera.

What's not to like? OK, so the price tag is not much shy of $6000 which does look pretty steep for a fixed lens camera, but this needs to be put in perspective given what you'd pay to have the same combo from anywhere else in Leica land (i.e. M Typ 240 body plus Summilux-M 28mm f1.4 ASPH lens = ouch!). And the question has to be asked… just how many M users typically use just one lens… usually either a 28mm or a 35mm? These focal lengths represent pretty much the essence of RF camera photography.

On a more practical note, a fixed lens means no dust-on-sensor issues and, more importantly, a more compact and, yes, less costly design… even with a fast maximum aperture of f1.7. It also means the lens is precisely matched to the sensor which has real benefits in terms of the imaging performance, particularly sharpness. In case you're wondering, the lens is marked 'Made In Germany' too.

## FAMILY TIES

Although a little smaller and lighter than a digital M, the Q still looks very much like one of the family, particularly in terms of its styling (which was done inhouse), but it also has the same luxurious feel thanks to the superlative quality of its construction.

The top panel is milled from a solid lump of aluminium while the main shell is a magnesium alloy component. All the markings are laser engraved and everything works with a typically Leica smoothness and precision. There's a traditional shutter speed dial and, on the lens, an aperture ring. Both have 'A' settings so, similar to Fujifilm's X100 models, the selection of the 'PASM' exposure control modes depends on whether both, either or neither are parked on 'A'. The lens also has a manual focusing collar and its distance scale is very niftily switched over when the macro mode is selected.

However, significantly, the Leica Q has autofocusing – engaged by setting the focusing collar to its 'AF' position – and here, perhaps, is a glimpse into the future. At first glance, the Q's lens really looks like it might be interchangeable and, on closer examination, there doesn't seem any reason why a mount couldn't be accommodated. Leica has hinted that the Q – its factory code is Typ 116, by the way – is just the start, but whether there'll subsequently be a selection of fixed lens models like Sigma's quattro dp series or an interchangeable lens camera isn't clear. Nevertheless, with its EVF and autofocusing, the Q does start to look something like the basic formula for a 'future M'. We shall see.

Importantly though, Leica has nailed the EVF in the Q. It's a LCOS-type display (the initials stand for Liquid Crystal On Silicon) with a resolution of 3.68 million dots and it's quite the best we've seen so far, superior even to Sony's excellent OLED displays. It's bright with a real world colour rendition, lots of definition and a good dynamic range. While the LCOS display is a field-sequential type (i.e. each point alternatively shows red, green and blue), there's no noticeable lag or colour 'tearing' when panning.

Proximity sensors in the eyepiece enable automatic switching between the EVF and Q's monitor screen which is a fixed TFT LCD panel with a resolution of 1.04 million dots and touch control. However, unlike the all-or-nothing T, the Q's user interface is conventionally menu-based with a four-way navigator and the touch controls are there as an option (although the facility can't be switched off completely).

## ESSENTIAL INGREDIENTS

The Q's sensor – source unknown and not the same device as is used in the M Typ 240 – has an effective pixel count of 24.2 million and a sensitivity range equivalent to ISO 100 to 50,000.

The effective pixel count gives a maximum image size of 6000x4000 pixels, but there's the option of recording at three smaller sizes. Additionally, there are two 'digital zoom' settings which equate to the 35mm and 50mm focal lengths and which can be selected on-the-fly via a button

**DESPITE ITS HERITAGE BEING IN INTERCHANGEABLE LENS CAMERAS, WHEN THE TECHNOLOGICAL STARS ALL EVENTUALLY ALIGNED, LEICA WAS ALWAYS GOING TO BUILD SOMETHING LIKE THE Q.**


on the back panel adjacent to the thumbrest. These are obviously crops, but in the case of the 35mm setting, the resolution is still 15.4 megapixels so it's a handy facility for, say, street photography. The crops are shown in the EVF and monitor just like the brightline frames in an RF camera's finder and, similarly, what's happening *outside* the frame can be seen as well. Furthermore, with RAW+JPEG capture, the RAW file is still recorded at the 28mm angle-of-view and the cropping frame can subsequently be moved around in Adobe Lightroom (which is supplied as a free download with the camera).

As is standard on Leica digital cameras, RAW files are captured in the Adobe DNG format. There's only one JPEG setting which is a manifestation of Leica's minimalist approach, encompassed in the slogan "*Das Wesentliche*" which translates as "the essential". In other words, why would anybody want to record lower quality images in-camera? Good question.

In the spirit of "*Das Wesentliche*", the Leica Q also lacks any picture presets (although JPEGs can be fine-tuned for sharpness, contrast and saturation) and, God forbid, any special effects. It does, however, have a set of subject/scene modes which include panorama stitching, an intervalometer and, just to contradict the last sentence, the 'Miniature' effect (well, it's more about focus than a gimmick, isn't it?).

The data heavy-lifting is done by Leica's current-generation 'Maestro II' processor which enables continuous shooting for stills at up a snappy 10 fps as well as video shooting at 1080/60p (see the Making Movies panel for the rest of the Q's video capabilities).

## SHARP SHOOTING

The Q's AF system is sensor based and uses contrast-detection measurement without, it would appear, any 'go-faster' processes, but it's still exceptionally responsive and very reliable. There's 169 measuring points which cover virtually the entire frame with the option of automatic or single-point selection, auto tracking and face detection.

Switching between single-shot and continuous operation is manual (via the main menu), but there are 'Touch AF or 'Touch AF + Release' operations available on the monitor screen. A low light/contrast illuminator is provided.

While the AF is very capable, it wouldn't be a real Leica camera if the manual focusing experience didn't make this way of doing things arguably the more desirable option. The focusing collar is freed from its 'AF' position by depressing a small button set into its focusing tab and the subsequent movement is as smoothly fluid as that of any Leica M lens. Similar to any M lens, the distance markings are in both metres and feet, and there's a depth-of-field scale for f4, f8, f11 and f16.

The minimum focusing distance is 30 centimetres, but as noted earlier, there's a macro mode which selected by turning a ring on the lens which also cleverly switches the distance scale to the close-up range of 17 to 30 centimetres. It's Leica showing off, really, but a very nice piece of precision mechanical engineering nonetheless. Focus assist is via the distinctly modern-era devices of a magnified image (up to 6x) with a focus peaking display in a choice of four colours.

## UP TO SPEED

The lens's aperture ring has click-stops in one-third EV intervals and the lens incorporates a leaf shutter with a speed range of 30-1/2000 second. It's described as a "mechanical" shutter, although of course, it's electronically controlled (and so fully dependent

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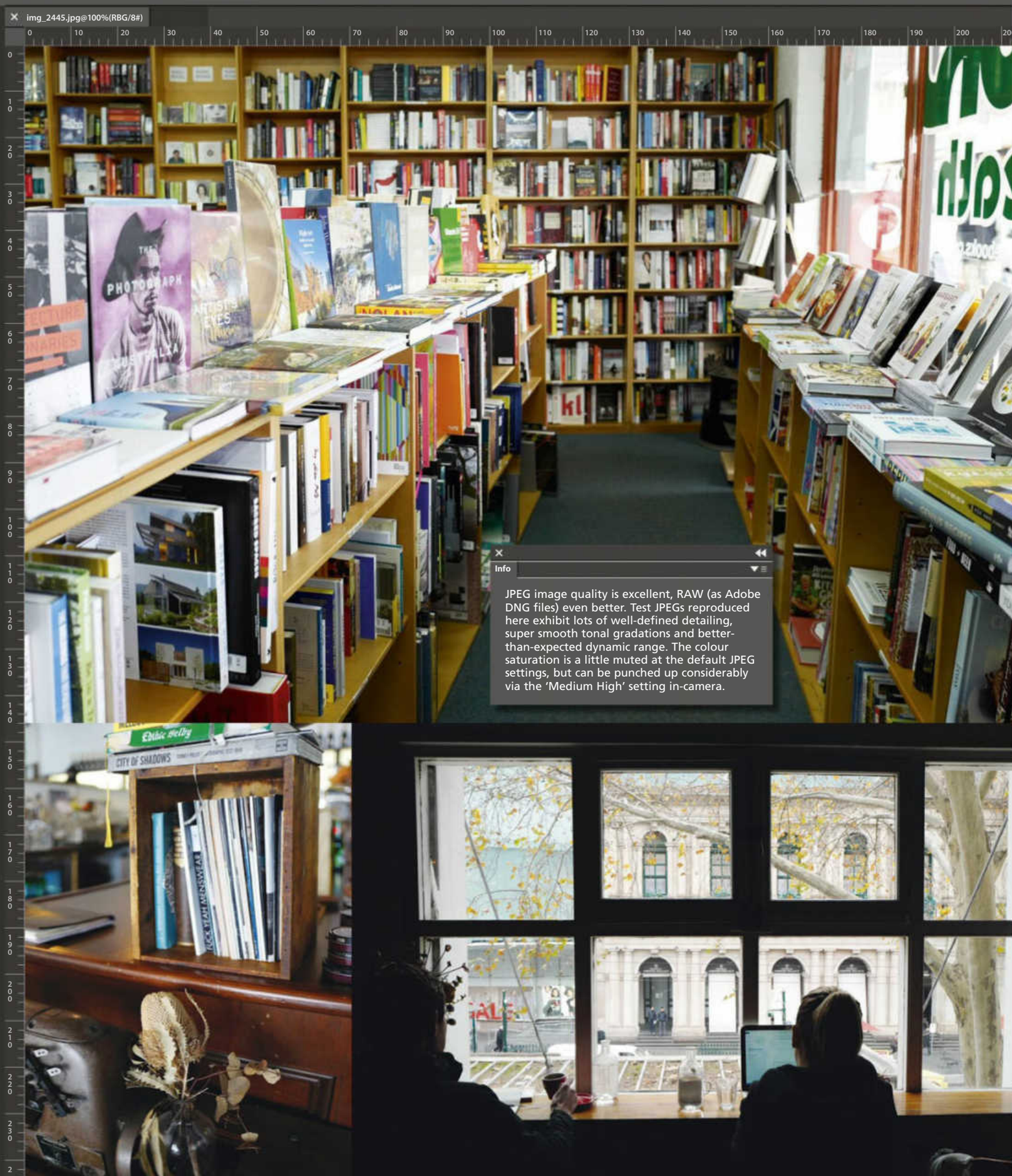
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Info
JPEG image quality is excellent, RAW (as Adobe DNG files) even better. Test JPEGs reproduced here exhibit lots of well-defined detailing, super smooth tonal gradations and better-than-expected dynamic range. The colour saturation is a little muted at the default JPEG settings, but can be punched up considerably via the 'Medium High' setting in-camera.
CITY OF SHADOWS
100%
Doc: 2.8mb


on battery power) and the word is used to distinguish it from the Q's sensor-based "electronic" shutter which takes the faster speed range on from 1/2500 second to 1/16,000 second.

With the shutter speed dial set to its '2000+' settings, the faster speeds are subsequently selected the camera's command wheel. The switchover between shutter types is performed automatically. Flash sync is at all speeds up to 1/500 second, but like any M body, the Q doesn't have a built-in flash. External units sync via a hotshoe only as there isn't a PC terminal.

Multi-zone, centre-weighted average and spot metering measurements are available and the auto exposure modes are supplemented by up to +/-3.0 EV of exposure compensation and auto bracketing over the same range for a sequence of three frames.

The white balance control options comprise auto correction, five presets, provisions for making and storing two custom measurements, and manual colour temperature setting over a range of 2000 to 11,500 degrees Celsius. No bracketing or fine-tuning. Also absent are any manually-set processing functions for dynamic range expansion or noise reduction and, perhaps not surprisingly, there isn't a multi-shot HDR capture mode. No doubt Leica thinks many Q users will shoot in RAW and a sort all this out post-camera.

Pared down to the essentials, the menu is a simple arrangement comprising one, continuously-scrollable section with the submenus accessed via a right-click of the navigator. The layout is actually crisp and clean with the emphasis on functionality above all else.

The live view screen can be configured to include a guide grid (the classic 'rule-of-thirds'), a real-time histogram, a highlight warning and a single-axis level indicator plus all the important status indicators and read-outs. All are obviously replicated in the EVF.

Definitely not quite so classical, is the built-in WiFi module which provides the convenience of NFC 'touch-and-go' connectivity. The Leica Q app allows for the wireless transmission of files and remote camera control, including exposure settings. The live view image is also available at the mobile device, either iOS or Android.


Menu design is also clean, simple and intuitive.


Replay screen can be configured for a real-time histogram and highlight warning (just visible as a small black section in the top left of this illustration).

## SPEED AND PERFORMANCE

With our reference 64 GB Lexar Professional SDXC (Speed Class 1) memory card loaded, the Leica Q fired off a burst of a burst of 26 JPEG frames in 2.454 seconds which represents a continuous shooting speed of 10.6 fps. The typical file size for this test was 8.7 MB so the Q has no problems delivering on Leica's shooting speed claims.

The JPEG image quality is simply delicious. The colours are slightly muted (fixed, if so desired, by setting it to 'Medium High' in the camera which adds some extra punch), but the dynamic range, crisply-defined detailing and smooth tonal gradations are all excellent.

Noise isn't an issue up to ISO 6400 and still acceptable at ISO 12,500, but the two highest sensitivity settings do exhibit some blotchiness in areas of continuous tone and the colour saturation suffers accordingly, but the sharpness less so. Nevertheless, the RAW files contain just so much detail that post-camera noise reduction can be applied without unduly diminishing the overall image quality. This, combined with the f1.7 lens speed and image stabilisation, give the Q exceptional low-light shooting capabilities.

Of course, the lens is part of the deal here and there's a distinctly Leica 'look' in terms of the contrast and colour balance. Centre-to-corner sharpness is pretty good even at f1.7, but excellent from f2.8 and beyond. There's no vignetting and it's very highly corrected in terms of distortion – three aspherical elements are included in the optical construction – and both

"A FIXED LENS MEANS IT'S PRECISELY MATCHED TO THE SENSOR WHICH HAS REAL BENEFITS IN TERMS OF THE IMAGING PERFORMANCE, PARTICULARLY SHARPNESS."


**While it's resolutely** a stills camera in design, the Leica Q is actually reasonably capable in the video department. Full HD resolution clips are recorded in the MP4 format (using MPEG 4 AVC/H .264 compression) at either 30 fps or 60 fps. Alternatively, you can record at 720/30p in the MOV format. Given its heritage, it's perhaps a bit surprising that there's no 24 fps 'cinematic' recording speed.

The Q has built-in stereo microphones – located just ahead of the hotshoe – and provides both a gain adjustment (to vary the sensitivity) and a switchable wind-cut filter. There isn't a stereo audio input which is a pretty clear indication that the Q isn't really intended to be a serious video camera.

Image adjustments are provided for sharpness, contrast and saturation, while image stabilisation and continuous AF are available. Interestingly, the lens employs just one element for autofocus adjustments so the operation is virtually silent which is a bonus when shooting video. Exposure control is fully automatic (including the ISO), but with the provision of the compensation override and the choice of metering methods. A dedicated video recording start/stop button is located adjacent to the shutter release on the camera's top panel. There's also a dedicated 16:9 aspect ratio imaging frame.

Even if video is only a part-time job for the Leica Q, it's still pretty good at it, delivering nicely stable footage and no discernible rolling shutter effects.

The auto exposure control adjusts pretty smoothly and rather quickly, but the contrast-detection AF isn't nearly as responsive. The good news here is that the finger tab on the focusing collar actually enables nicely smooth manual control… with the assistance of both a magnified image and a focus peaking display.

spherical and chromatic aberrations. The Q does perform some in-camera corrections for lens aberrations, but regardless of how it gets there, the end result is nothing short of brilliant.

The out-of-focus effects are beautifully smooth so images exhibit real depth and allure. And the 28mm focal length is hugely versatile, providing plenty of scope for experimenting with composition and provides the 'room' to crop later on if necessary.

Part of the whole Q experience us undoubtedly the handling. It feels like an M and can be worked like one too, but there's also the option of going to full point-and-shoot operation – complete with touch screen controls – or any auto/manual combination that's preferred in between.

However, what's really telling is that the Q is as comfortable – and pretty much almost as efficient – to use with manual focusing and exposure control as it is to set everything to auto. The simplicity – and this word is used in a very positive sense – is refreshing and, much more so than the T, the Q balances the traditional and contemporary in a way that gives it far wider appeal.

## THE VERDICT

Let's talk money. Live with the Leica Q for even a short period of time and the price tag becomes easier to justify. It *is* an expensive camera, but then it is a full-blown Leica – in terms of the build quality (both body and lens), the way it operates and the performance – and it's also a combination of features and capabilities that makes for an immensely competent package… more so straight out of the box than any of the models suggested as rivals. And, in the end, there's also a certain degree of exclusivity that comes with Leica's 100-year-old legacy and the considerable reputation that this has built. In the end, potential buyers will have to decide whether they're happy to pay a premium to have this cache.

But beyond the brand and the badge, the Leica Q is a truly fine camera that's a sheer joy to use and delivers wonderful results. Can't really ask for anything more than that.

## VITAL STATISTICS

## LEICA Q $5900

Type: Fixed prime lens digital compact camera with electronic eyelevel viewfinder.
Lens: Leica Summilux 28mm f1.7 ASPH. Eleven elements in nine groups (three aspherical types). Aperture range is f1.7 to f16 adjustable in 1/3-stop increments. Built-in optical image stabilisation. Metal lens hood supplied.
Focusing Type & Range: Contrast-detection measurement with 169 focusing points. Auto/manual point selection, face recognition and auto tracking modes. Focus frame adjustable for size. Range is 30 cm to infinity. Macro focusing down to 17 cm. Manual switching between single-shot and continuous modes. Low light/contrast assist provided by built-in illuminator. Manual focus assist via magnified image (up to 6x) and focus peaking display (red, green, blue or white). Touch AF operation available via monitor screen.
Shutter Type & Speeds: Electronically-controlled leaf, 30-1/2000 second plus 'B'. Flash sync up to 1/500 second. Sensor-based shutter has a speed range of 1-/2500-1/16,000 second.

Metering: Multi-zone, centre-weighted average and spot.
Exposure System: Program (with shift), aperture/shutter-priority auto and manual plus 11 subject/scene modes. Up to +/-3.0 EV exposure compensation, an AE lock and auto exposure bracketing (over three frames).
Sensitivity: ISO 100, 200, 400, 800, 1600, 3200, 6400, 12,500, 25,000 and 50,000.
Sensor: 24.0x36.0 mm CMOS, 26.3 million pixels total (24.2 MP effective). No optical low pass filter.
Image Size: 6000x4000, 4272x2848, 2976x1984 and 1600x1080 pixels. 14-bit RAW (Adobe DNG) files captured at 6000x4000 pixels. RAW+JPEG capture available.
Video Recording: MP4 format at 1920x1080 pixels; 60 or 30 fps (progressive scan) and 16:9 aspect ratio. MOV format at 1280x720 pixels at 30 fps (progressive scan) and 16:9 aspect ratio. MPEG 4 AVC/H .264 compression. Stereo microphones built-in with gain settings and wind filter. No stereo audio input provided.

Continuous Shooting: Up to 10 fps – with continuous AF – for a burst of up to 40 images with JPEG/large/fine capture and up to seven images with RAW capture. Medium speed continuous shooting at 5.0 fps and low speed at 3.0 fps
Formats: JPEG, Adobe DNG, MP4.
Flash: No built-in flash. External flash units sync via a hotshoe.
White Balance: TTL measurement via image sensor. Auto, five presets, two custom measurement and manual colour temperature setting (2000 to 11,500 degrees Kelvin).
Viewfinder: Electronic, LCOS-type with 0.65x magnification, 3.68 million dots resolution and 100 percent frame coverage. Eyepiece strength adjustment built-in. Auto/manual switching between EVF and monitor screen.
Storage: SD/SDHC/SDXC memory cards with UHS-I support.
Interface: USB 2.0, Micro HDMI (Type D).
Additional Features: Aluminium/magnesium alloy bodyshell, 7.62 cm fixed monitor screen (1.04 million dots resolution) with touch controls, digital zoom (1.2x or 1.5x, but standard 28mm field-of-view retained with Adobe DNG file), JPEG picture adjustments (contrast, saturation and sharpness), monochrome shooting mode, sRGB and Adobe RGB colour space settings, in-camera panorama stitching, intervalometer for time lapse, customisable 'Fn' button, dual-delay self-timer (two or 12 seconds), audible signals, real time histogram display, guide grid, highlight warning, level indicator, 12/30 thumbnail displays, playback zoom, built-in WiFi transmitter with NFC connectivity.
Power: Rechargeable 7.2 volts, 1200 mAh lithium-ion battery (BP-DC12 type).
Dimensions (WxHxD): 130.0x80.0x93.0 mm.
Weight: 590 grams (without battery or memory card).
Price: $5900. Available in black only.

Distributor: Leica Camera Australia Pty Ltd, telephone (03) 9248 4444 or visit www.leica-camera.com

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# Fairer Worker

## PHASE ONE XF

The first new 'clean sheet' medium format SLR camera system since Hasselblad's H1 back in 2002, Phase One's XF symbolises a revival in digital medium format photography.

REPORT BY **PAUL BURROWS**


Five years in the making and a huge investment, Phase One's XF is the first all-new medium format SLR platform since Leica's original S2 which was launched at Photokina 2008.

**IT'S HARD TO DETERMINE WHEN** digital medium format photography turned the corner towards a future that hasn't looked so bright since the heady days of when it was the only digital capture game in town. It almost certainly has something to do with the arrival of the ultra-high resolution 35mm-style D-SLRs. Nikon's original D800 – especially in the D800E variant – looked more threatening than anything that had come before with 36 megapixels looking like the 'sweet spot' for a sensor of this size. But the move to even higher resolutions has really only served to confirm that there's no substitute for big pixels… at least not when it comes to optimising dynamic range. As we've noted previously, not all 50 MP sensors are created equal.

Phase One can't really have predicted this turn of events when it started work on its new-from-the-ground-up digital medium format camera platform, but the timing has worked beautifully in its favour. The impetus for creating the XF no doubt originally came from addressing the limitations of its late-1990s vintage Mamiya-sourced platform – dating back to the 645AF – compared to its chief rival from Hasselblad. Admittedly, 'Blad's current H5D series can trace its roots directly back to the not-all-that-much-younger H1 platform (launched in 2002), but that design offered the all-important capacity to interchange viewfinders and had more contemporary features such as a detailed on-camera LCD info display and greater integration between the body and the capture back. Latterly this has allowed for conveniences such as powering the capture back from the camera body.

Given Mamiya was pretty cash-strapped (again!) when it developed the 645AF, by any measure it was a fairly unremarkable package (even back in 1999) and, unlike the H1, certainly didn't allow any scope for significant modernisation. Even the last-of-the-line DF+ was a bit of a patch-up and, more concerningly, a technological dead-end. In the end, quite simply Phase One's ever more progressive capture devices were being held back by its camera platform which is no doubt one reason why, for example, it adopted features such as touchscreen controls on the IQ series models. However, Hasselblad's 'closed loop' policy means that, from the H3D onwards, this

> Phase One has bitten the bullet in terms of the time and investment needed to create something which ticks all the necessary boxes.

Top panel view shows off the XF's clean and uncluttered lines. The prism finder incorporates both a hotshoe and a PC flash terminal.


Single memory card slot accepts UDMA-7 speed compliant CompactFlash devices.

Basic camera operations are based around three input wheels for setting apertures, speeds and sensitivity. All the XF's external controls (except obviously the shutter release) can be set to a variety of functions, giving a high degree of customisation.


Phase One continues to expand its lens system and among the recent additions is a highly-desirable Schneider Kreuznach 35mm f3.5 leaf-shutter wide-angle (equivalent to 21mm with the 60 MP and 80 MP sensor backs)..

platform isn't available to the users of Phase One backs. There's now the H5X body, but the level of integration that's possible with this camera is still an issue so clearly something had to be done… and Phase One has bitten the bullet in terms of the time and investment needed to create something which ticks all the necessary boxes.

## Making It Work

Consequently, the XF is endearingly old school in some aspects and absolutely contemporary in others, including a high degree of future-proofing via provisions for extensive firmware upgrades. What's very clear though, is that Phase One has designed it to either match – or exceed – what's on offer from the Hasselblad H5D, and with the added attractions of the new IQ3 series capture backs (more about these later on).

The angular styling is more reminiscent of Mamiya's RZ67 than anything else, although the XF actually isn't quite as bulky. Nevertheless, it's still quite heavy thanks to the beefy prism finder and the fact that all the external covers are made from aerospace-grade alloys. It feels in a very different league to the outgoing 645DF+ body. The Mamiya 645AF lens mount is retained, but beyond this the camera is all Phase One's own work, including the autofocusing system. The 90-degree prism viewfinder is fitted as standard, but can be interchanged with an optional waistlevel finder which, in particular, can be more desirable in some studio situations. The scene coverage is 97 percent for both, and the autofocusing is body-based so remains available regardless of the camera's configuration. The prism finder incorporates both a flash hotshoe and a PC terminal and, interestingly, the XF incorporates a Profoto 'Air' transmitter for remote radio-frequency triggering of the Swedish company's flash units. A nice little piece of Scandinavian co-operation.

The XF boasts a good-sized handgrip atop which is one of its cleverest features… a large display panel with a capacitive touchscreen which works brilliantly in the field. There are three input wheels – similar to a Sony Alpha 7 series body – which are essentially used to set apertures, shutter speeds and the ISO, and can be configured to do any of

these operations. The direction of each wheel's rotation can also be changed, but they can also be locked to avoid accidental adjustment. The control/display panel – which Phase One calls the "One Touch UI" – is accompanied by a pair of long, rectangular buttons which can be used for more conventional selecting and setting duties (if desired, the touchscreen operation can be turned off). In fact, all the XF's external controls can be customised with the settable functions including autofocusing, the AE lock, mirror lock-up and depth-of-field preview. The display itself can be switched between 'Simple' and 'Classic' layouts – the latter being more comprehensive – or customised more specifically and there's adjustable backlighting to vary the brightness. It's also a multi-coloured display so, for example, out-of-range indicators are shown in red and any auto settings (i.e. apertures, shutter speeds, etc.) are shown in blue. Furthermore, the degree of integration with IQ3 backs – made possible by a new "High Bandwidth" interface – allows for the whole panel to be replicated in their monitor screens… obviously again with touchscreen controllability which even includes shutter release.

The XF is powered by the same 3400 mAh BP-series lithium-ion battery packs as the IQ3 backs which enables a handy 'Powershare' facility should one or the other fail mid-shoot. The flat battery can be replaced without the system switching off (but it won't operate with just one battery). Either component's on/off button powers up both components. There are also two shutter release buttons on the XF body; one conventionally located atop the handgrip and the second, more classically, positioned alongside the base of the lens mount where it's designed primarily for use with the waistlevel finder and low-level shooting.

## Worker Bee

On the inside, the XF has a new TTL autofocusing system based on a one-megapixel CMOS sensor designated the HAP-1. As on the H5D, autofocusing is still only based on a centralised zone in the viewfinder, but Phase One's in-house developed 'HoneyBee Autofocus Platform' (HAP for short) is its answer to Hasselblad's 'TrueFocus' in terms of delivering enhanced accuracy and speed. The principle is different, but the intent is the same; namely to make the autofocusing work as efficiently as possible so, within this central zone, there are actually 1000 'floating' measuring points with the option of setting Spot, Average or Hyperfocal AF modes. As the name suggests, this last mode allows for the autofocusing to be fine-tuned to optimise depth-of-field by focusing on the lens's hyperfocal point rather than at infinity. Additionally, focus calibration is available for up to 32 individual lenses – by serial number with the later models – to correct for any front- or back-focus variations.

Low-light AF assistance is provided by a built-in 'Precision White Light' illuminator which has a brightness adjustment.

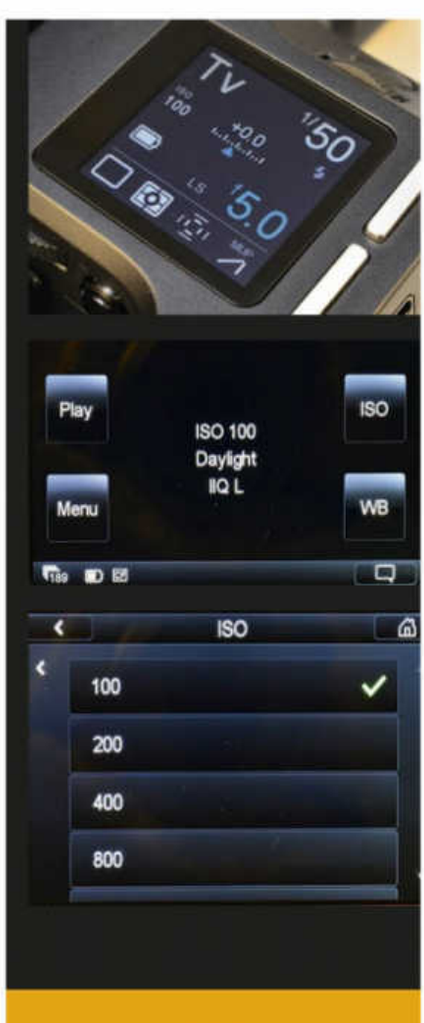
When the waistlevel finder is fitted, the HAP-1 sensor provides not only autofocusing, but also spot metering so auto exposure control is retained. Matrix (i.e. multi-zone) and average metering modes are available via the prism finder.

The XF has a full set of 'PASM' exposure control modes backed by an AE lock, up to +/-5.0 EV of compensation and auto bracketing over sequences from two to five frames. Usefully, the auto setting ranges for apertures, shutter speed and ISO can be limited to a preset maximum and/or minimum so, for example, a lens's largest or smallest apertures can actually be locked out or very slow speeds avoided when shooting hand-held.

The bodyshell is entirely constructed from aerospace-grade alloys and styled to match the look of Phase One's IQ series capture backs. IQ3 series backs offer a very high level of integration with the camera body. Earlier IQ2 and IQ1 backs can be fitted after a firmware upgrade.

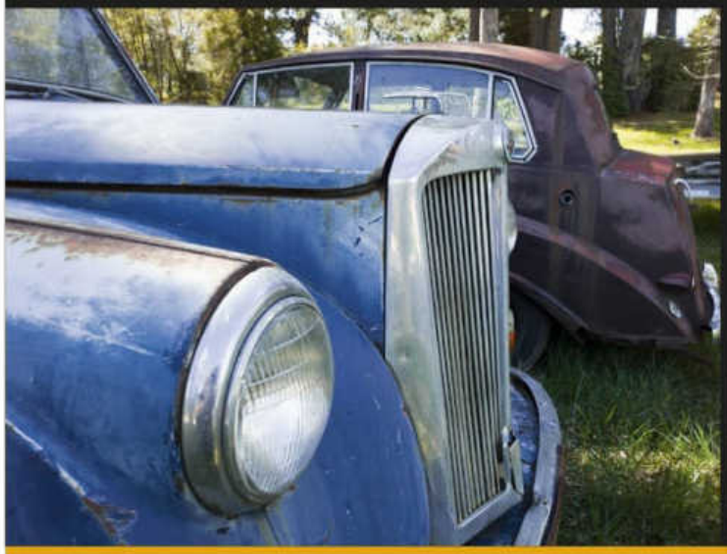

Info display panel atop the handgrip provides touch screen controls and multi-coloured read-outs.

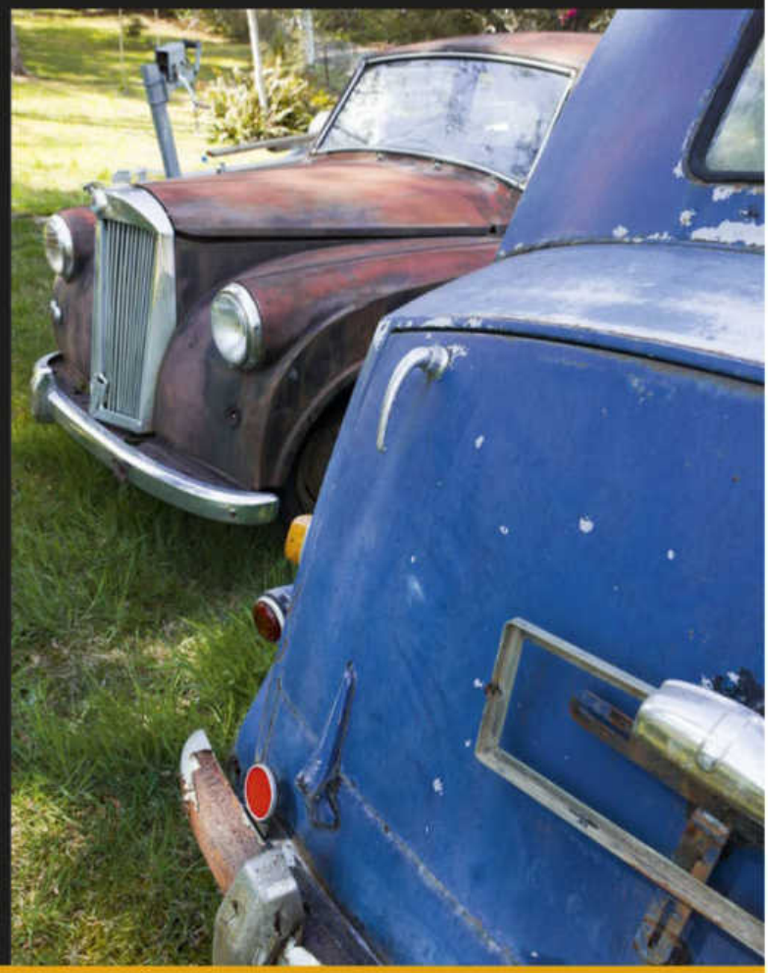
IQ3 backs have a simple, easy-to-navigate menu system. Integration with the XF allows for the camera's control panel to be replicated here too.



**Above:** Test images made with the IQ3 60 – which uses a CCD-type sensor show why there's ultimately no substitute for bigger pixels, starting with a wide dynamic range so lots of detail is retained in both the highlights and shadows, exceptional levels of detailing (not really possible to adequately reproduce here) and a velvety smooth tonality.

**Right & Below:** The 50 megapixels CMOS-equipped IQ3 50 capture back boasts an exceptionally wide dynamic range, super smooth tonal gradations and beautifully crisp definition. Test images taken with the Schneider 35mm f3.5 LS wide-angle lens (equivalent to a 27mm on this sensor). Capture file sizes (in Phase One's losslessly compressed IIQ format) were typically around 58 MB.





The XF body incorporates a focal plane shutter with a top speed of 1/4000 second while timed long exposures of up to 60 minutes are possible (and supported by the IQ3 backs). Flash sync is at all speeds up to 1/125 seconds, but the Phase One lens system includes a growing selection of leaf-shutter types from Schneider which enable a maximum sync speed of 1/1600 second.

There's a 'Vibration Delay' mode which can be preset from 0.5 to 8.0 seconds for shutter release after the mirror has been locked up. Commendably, mirror lock-up now remains engaged until it's switched off so it doesn't have to be re-activated after each exposure. Rather sexier is the 'Seismograph' mode which locks up the mirror (and locks open the focal plane shutter with LS lenses) and then uses the camera's built-in six-axis gyros and accelerometer to determine when all vibrations have died away sufficiently to allow automatic shutter release. The seismograph function also shows how much the camera is vibrating which can be a bit of a revelation for anybody who thought that their tripod was very sturdy and hence stable.

Phase One says that additional facilities based on the gyros and accelerometer will be provided in the future via firmware upgrades, but right now they also drive a 'Virtual Horizon' display that's selectable in the IQ3's monitor screen.

## Backs To Work

The new IQ3 backs have the same basic specifications as the IQ2 series, but have been designed to fully integrate with the XF via the new interface mentioned earlier. There are some notable new features, starting with the 'Exposure Zone' tool which overlays a captured image with a range of colours that indicate zones of under- and overexposure in specific values. It's essentially the same idea as highlight/shadow warnings, but a whole lot more sophisticated and allows exposures to be then more precisely fine-tuned as per the area indicated by a specifically coloured zone.

Also very neat is the 'Temperature Graph' which maps the temperature of the sensor over time so it can be allowed to stabilize prior to commencing an exposure. This is especially important now that exposure times of up to 60 minutes are possible. The 'Exposure Calculator' tool is also primarily designed for low light or night photography. After a preview is captured at a high ISO with a large aperture, the calculator then determines the exposure times required at lower sensitivity settings and/or smaller apertures.

There's also an enhanced 'Exposure Warning' facility which allows the highlight warning level to be set, along with its colour, plus a clip warning with its specific colour too.

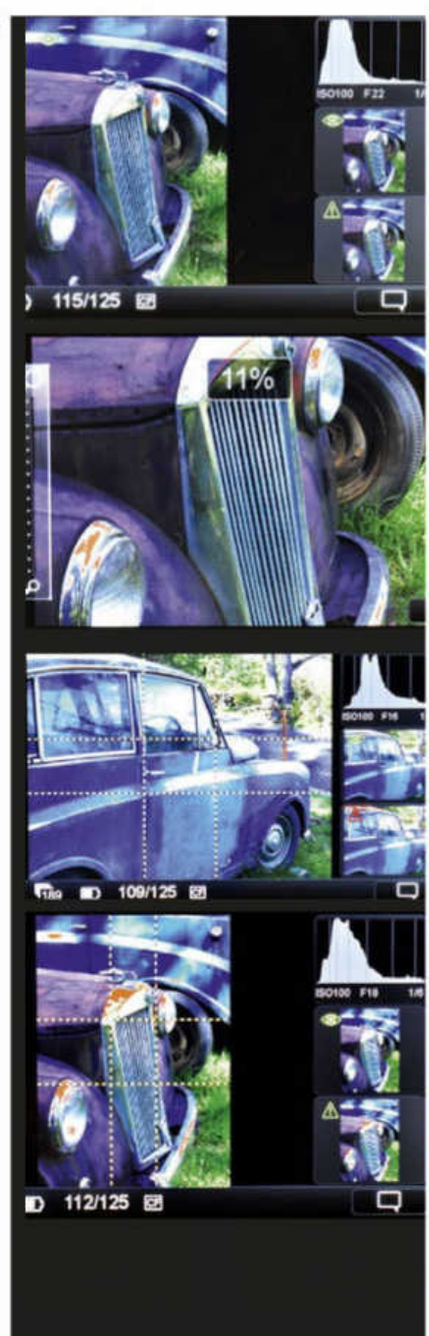
Both the IQ2 and IQ1 series backs can be used on the XF – with a firmware upgrade – but obviously none of the facilities that depend on the 'High Bandwidth' interface are available, including power sharing. However, an upgraded IQ2 back will support the XF camera controls in their monitor screens and gain selected IQ3 features such as the 'Exposure Zone' tool. At this point, the XF doesn't support the IQ2-based Leaf Credo backs, but the IQ3 backs can be used on the Phase One 645DF/DF+ bodies.

## Performance

The XF immediately scores highly for both its handling and efficiency of operation. It's a big camera, but the well-shaped grip is very comfortable and the XF feels well balanced even with a big lens like the new Schneider 35mm f3.5 LS wide-angle fitted. Hand-holding really is quite feasible, both in physical terms and how the camera works.

Operationally, it's chalk and cheese compared to the previous Mamiya-sourced bodies and while Hasselblad also offers a more contemporary front/rear input wheel control arrangement, Phase One goes a lot further. The XF's third wheel additionally makes ISO setting immediately accessible, but the touchscreen does the same for everything else, and it's completely intuitive to master. It's also highly addictive to use, while the option to doing everything from the back's screen means the same level of speed and efficiency is available regardless of how the camera is being used. The prism finder is truly fabulous while the new feedback features of the IQ3 backs – especially the 'Exposure Zone' overlay – are very helpful and any subsequent fine-tuning is very quickly and easily applied. The impression here is very much of a 'total package' design approach with everything working in harmony to achieve the desired outcome as

> "The XF is endearingly old school in some aspects and absolutely contemporary in others, including a high degree of future-proofing via provisions for extensive firmware upgrades."




Capture review options include a histogram, guide grids and highlight warning (which can be set to a desired level). Not shown here is a novel 'Exposure Zone' coloured overlay and selected clipping warning display to supplement the highlight warning.


SPECS

# PHASE ONE XF

**Type:** Professional digital medium format SLR with Mamiya 645AF bayonet lens mount.
**Focusing**: TTL automatic via phase-detection type using one megapixel CMOS 'Honeybee' sensor array. 'Floating Point Architecture' processing with Spot, Average and Hyperfocal modes. Manual switching between one-shot and continuous modes, full-time manual override using focusing collar on lenses, low light/contrast assist via built-in 'Precision White Light' illuminator. AF micro-adjustment for up to 32 lenses.
**Metering:** TTL using one megapixel CMOS sensor with matrix, average and spot measurements plus TTL flash metering.
**Exposure Modes:** Program, shutter-priority auto, aperture-priority auto, metered manual, and TTL auto flash. Exposure compensation up to +/-5.0 EV in 1/3, 1/2 or full stop increments.
**Shutter:** Electronic, focal plane type, 60 minutes to 1/4000 second plus B. Flash sync up to 1/125 second. Schneider LS lenses have built-in leaf shutter with flash sync up to 1/1600 second.
**Viewfinder:** Interchangeable; 90 degree prism finder is standard. Coverage = 97% vertical/horizontal. Interchangeable focusing screens (choice of three). Standard screen has AF and spot metering area marks. Eyepiece strength adjustment built-in. Optional waistlevel finder available.
**Flash:** External units sync via ISO-standard hotshoe on prism finder or PC terminal. Integrated Profoto 'Air' RF transmitter for wireless remote triggering of Profoto studio flash equipment.
**Additional Features:** Mirror lock-up with adjustable vibration delay setting (0.5-8.0 seconds), AE lock, depth-of-field preview, 4.0 cm LCD camera control panel with touchscreen functionality and customisable display, dual shutter releases, auto exposure bracketing (two to five frames), adjustable setting limits (apertures, shutter speeds and ISO), customisable controls, remote control terminal, audible signals (switchable), variable stand-by time-out, 80 custom settings.

**DIGITAL SECTION – Phase One IQ3 50**
**Sensor:** 51.4 million pixels, full-frame CMOS with 33.1x44.2 mm imaging area. Sensitivity is equivalent to ISO 100-6400.
**Focal Length Increase:** 1.3x with 6x4.5cm format lenses.
**Formats/Resolution:** RAW with lossless compression on IIQ RAW files, two levels (typical file sizes are 50 MB and 33 MB). 8280x6208 pixels, 48-bit RGB colour.
**Recording Media:** CompactFlash memory card with UDMA-7 support.
**Continuous Shooting:** 1.8 frames per second.
**White Balance:** Auto, four presets (daylight, fluorescent, tungsten and flash), custom measurement.
**Interfaces:** FireWire 800, USB 3.0, WiFi (802.11n).
**Additional Digital Features:** Wireless remote control via Capture Pilot app, 1.0 GB of high-speed buffer memory, 8.1 cm LCD TFT monitor screen (1.15 megadots), touch screen controls (menus, browse, zoom, etc), 'Virtual Horizon' display, histogram display, focus mask function (for checking depth-of-field and focus), superimposed grids (choice of six, also adjustable for colour and line style), USB 3.0 connection, FireWire 800 interface for tethered operations, automatic rotation for horizontal and vertical framing, built-in WiFi. The compatible shutter speed range is 60 minutes to 1/10,000 second. Dynamic range is 14 f-stops.
**Power:** 3400 mAh 7.2 volt lithium-ion battery pack. 'Powershare' facility available when IQ3 Series backs are fitted.
**Dimensions (WxHxD):** 152x135x160 mm (camera body with prism finder).
**Weight:** 1390 grams (camera body with prism finder).
**Price:** $52,470 (inc. GST) for complete XF camera with IQ3 50 capture back, 90-degree prism viewfinder and Schneider Kreuznach 80mm f2.8 AF LS standard lens. Camera kit also includes four battery packs, 16 GB CompactFlash memory card and card reader. The XF IQ3 system is supported with a five year warranty
**Distributor:** L&P Digital Photographic Pty Ltd, telephone (02) 9906 2733, **www.lapfoto.com.au**

efficiently as possible. Consequently, the XF+IQ3 combination is no more demanding to use than any pro-level full-35mm D-SLR and, although philosophically quite different, comparable to the Pentax 645Z.

We tried the XF with both the IQ3 60 and IQ3 50 backs, but concentrated most on the latter given the spotlight on 50 MP capture across several formats at the moment. Perhaps the most ironic aspect of our test is that the XF can be successfully used hand-held in situations where the Canon EOS 5Ds can't because of sharpness issues – purely related to the pixel size and density – related to either internal vibrations or external camera shake. For once, a bigger and heavier camera has benefits. Less surprising, of course, is that bigger pixels have benefits too, and this is most evident in the exceptionally wide dynamic range – quoted at 14 stops – delivered by the IQ3 50. Smoother tonal gradations, crisper definition and a superior signal-to-noise ratio are key additional benefits to which can be added the various performance advantages of medium format lenses. For example, Phase One says its latest 'Blue Line' models – of which the 35mm LS is one – are good for resolutions of "beyond" 100 megapixels, but also aberrations such as diffraction are less of an issue. The CMOS-based IQ3 50 also delivers exceptional low-light performance all the way up to ISO 6400 which makes its longer exposure durations quite useable… and delivers an image quality that the users of smaller format camera systems can only dream about.

> The XF boasts a good-sized handgrip atop which is one of its cleverest features... a large display panel with a capacitive touchscreen.

## The Verdict

Not surprisingly, the XF in concert with any of the IQ3 capture backs is an expensive proposition and this remains the key marketing challenge for Phase One (along, of course, with Hasselblad). The big differences compared to the 50 MP Canons might be easier to justify on a number of levels, but the Pentax 645Z is harder to argue around given it's using a similar size and type of sensor as the IQ3 50. So we're not going to try to do it here beyond stating that the XF is much better built, offers the flexibility of interchangeable finders and is supported by a bigger system of dedicated lenses (many with leaf-shutters), but whether all this is worth the extra investment is harder to determine.

Consequently, money can't be the sole consideration here and it's more relevant to concentrate on what the XF offers which is an extremely well-thought-out digital medium format platform that, beyond the benefits already listed in the previous paragraph, delivers exceptional levels of convenience, efficiency and functionality. With the XF, Phase One now has a camera body that's able to match what it has been offering with its capture backs and image processing software for some time – intelligently designed products that enable working photographers to work better.

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# Fast Tracking

## ZOOM H5 RECORDER

Four tracks of HD audio with great versatility and a hot-shoe mount for your camera. What's not to like?

REPORT BY **JEZ FORD**


**ZOOM HAS MADE A GREAT SUCCESS** of its range of audio recorders. Even the lowliest of its 'H' range delivers high-quality audio recordings with the ability to raise bit-rates far above CD quality — up to 24 bits per sample compared with CD's 16, and sampling rates of 96kHz, compared with CD's 44.1kHz. And hitherto the model numbering has been marvellously self-explanatory. The little H2n recorder is a two-track or stereo recorder. And the H6 is a six-track recorder, Zoom's highest level yet.

Here we have the H5 — which turns out to be a four-track recorder, with two tracks (L/R) from the X/Y stereo condenser mics on the front, two more from the inputs at the rear. Zoom already has the four-track H4n, so a new H5 nomenclature was required. But what's different?

### Mike swapping

The biggest difference is that the H5 adopts the H6's system of swappable microphone capsules. The H4n has a not dissimilar built-in pair of X/Y stereo condenser mics on the front, but these can't be removed. On the H5, however, you can pull them off and replace them with any of Zoom's available capsules — these include a small shotgun mike, a mid-side design, and a capsule that replaces the mikes with two additional inputs, allowing four-track recording from all external mikes. There's also the slightly larger X/Y capsule that comes with the H6 (see p40).

In its simplest form, though, you can set the H5 to record in stereo only and then pipe the result down a cable into your D-SLR's external audio or mike input, to have all your audio and video pre-synced on the camera.

The H5's line output can also be dropped by up to 30dB if you're plugging it into a high sensitivity mike input on your camera. Along with the optional HS-1 hot-shoe mount, this is another sign that Zoom is including increasing numbers of features aimed at videographers, as well as for its traditional market of sound recordists.

### Field recording

While we thought the H6 just a bit large for sitting on top of your D-SLR, the H5 is a much more manageable size. Perched thus, its clear monochrome display faces up, the X/Y capsule mike faces forwards and the two XLR-TRS sockets face the back for your choice of balanced XLR or unbalanced quarter-inch plugs. These are fine for microphones or line-level inputs (mixers, keyboards etc.), so you might, say, use the X-Ys for a general front balance but plug up a pair of lapel or handheld mikes for interviewer and interviewee. Or in a music context you might take a room recording from the front mikes and an off-desk mix or drum mix into the two other inputs.

Note that these are not sensitive enough for direct input of guitar or bass; you'll need a mixer or effects unit to sufficiently raise their levels. The gain dials are also easily accessible — the mike capsules have their own controls (the X-Y pair has a single stereo volume dial for the L-R channels), while the separate little gain dials for channels 1 and 2 sit below the display.

All these dials sit under sturdy steel bumper bars, partly for protection but also for practicality — it's far easier to smoothly adjust the volume with this arrangement.

Zoom's ease of use is legendary, and the H5 is as simple as any of them. From power off you can be actively recording within five seconds. If you leave it in standby there are various ways to be even quicker. If you're recording a live band simply set the Zoom to start recording automatically at a certain level threshold. And you can couple this with its 'pre-recording' function, where it will constantly capture the input signal while in standby, so your recording will start two seconds before you press the record button (or before it automatically triggers). Clever stuff!

As with the H6 you can play back recordings while overdubbing onto any unused tracks, and you can keep on overdubbing. Previously Zoom has mentioned a limit of 99 versions of any one track but even that generous limit seems to have been removed here.

There is also a new 'mix-down' function, where balance and level can be applied to each of the four tracks and a new stereo mix created inside the player itself. This is mighty handy for a temporary mix before the tracks are exported to a larger program where a post-production soundtrack can be constructed.

There's a range of audio input settings that can be applied — a compressor/limiter handy for voiceovers, a low-cut filter, phantom/plug-in power for microphones that need it.

One highly recommendable option is that you can set the Zoom to make a 'back-up' copy of every recording, which will be made at a level 12dB lower than your main recording. So if your rowdy guitar player pushes a recording unexpectedly beyond the available headroom and into the unpleasant realms of digital distortion, just grab the back-up copy and use that, or patch the original with it. This function could save a career with an important recording!

You can change the speed or pitch of recordings in the Zoom itself; there's a metronome and even a built-in guitar/bass tuner.

The Zoom H5 Recorder is nicely proportioned to use with D-SLRs and attaches via the camera's hotshoe accessories mount.

## USB connection

In our experience with Zoom's recorders, we've always previously taken out the SD card and transferred files over to the computer. But you can now connect the mini-USB socket direct to your computer and pull the files directly across that way. Even more remarkable, you can use the Zoom as a live USB interface, feeding its four channels in real time to your computer's preferred recording program. The only limit here is that it will pass 44.1/48kHz data in this way but not 96kHz. We tried it with ProTools, which is now much friendlier to non-Digidesign interfaces than of old, and the H5 appeared in its Playback Engine and offered its four inputs separately or as stereo pairs straight into the program. (To avoid feedback, route the outputs via a bus channel!) This is a useful bonus, given a four-channel USB interface might set you back most of this price on its own.

Talking of price, we have quoted RRPs here, but the distributor Dynamic Music was keen that we point out that the $499 RRP of the H5 will translate to an "expect to pay" price of perhaps $379, even from legitimate Australian resellers. (If in doubt as to who those are, use the 'Find a Dealer' resource on Dynamic Music's website.) With the accessory pack of wired remote control,AC adaptor and hairy mike shield the RRP is $579 ($469).

## Verdict

This may be the Goldilocks recorder in Zoom's range — far more versatile than its two-channel recorders, not so cumbersome as the larger H6 but with most of its technical prowess and, crucially, the system of swappable mike capsules. With staggering versatility and top-notch recording quality, it could not have impressed us more.

### CAPSULE RECAP

The H5's front X-Y condenser capsule (above left) is called the XYH-5. It can be replaced by other optional capsules, which currently include:

- the **MSH-6 Mid-Side capsule** ($149), with its bulbous hemisphere facing directly forwards, capturing audio from directly ahead. Less obvious is its second microphone, which collects ambient information from either side (hence the name MS, for Mid-Side). The level at which this side information is added or subtracted from the front microphone can be adjusted after the recording in post-production;
- the **SHG-6 shotgun mike capsule** ($169), which is quite a small shotgun, good for a head-and-shoulders interviewee filmed at two or three metres, less so for distant zooming in a noisy environment;
- the **EXH-6 capsule** ($99), which is not a microphone in itself but adds instead an extra two XLR-TRS sockets, so you can record four entirely external inputs;
- the **XYH-6** ($149, pictured above right)) — this X-Y condenser pair from the six-track H6 recorder has larger diaphragms. We found that recordings gained from a better depth of ambience and, it seemed, a slightly lower noise floor.

As with the main unit, street prices will likely be $20-$30 cheaper per unit than the RRP.
More info: **www.dynamicmusic.com.au**

# D750

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Photo by Clark Little

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*At the heart of the image*

# Business Machine

## EPSON SURELAB SL-D700 'DRY FILM' MINILAB

If you're in the business of selling photo prints, Epson's new compact commercial inkjet printer offers convenience, speed, quality and economy for on-demand applications or in-situ operations.

REPORT BY **TREVERN DAWES.**


**The release of Epson's first compact** 'dry film' mini-lab printer, the SureLab SL- D700, opens up opportunities for commercial photographers, photo mini-labs and general businesses, organisations, institutions, clubs, etc., to own and operate a relatively small, on-site and portable facility for fast on-demand printing.

Mini-lab type operations are a prime target for this printer. It's a compact, portable, economical and low-maintenance unit with no chemicals involved, no ventilation provisions required, no awkward waste disposal problems and requiring nothing more than a standard power supply. Print longevity rates are higher than conventional wet D&P systems. The SureLab SL-D700 is a stand-alone printer that links via a high-speed USB 2.0 cable to either PC or Mac computers.

## Description

With dimensions of 430 millimetres in depth, 354 millimetres high and 460 millimetres wide, the SL-D700 is a relatively small mini-lab that doesn't occupy too much desk space and is easy enough to position and set up. It weighs in at 23 kilograms. As a portable unit, fully loaded with inks and paper to take to venues and events on a short term basis, it will require a trolley for transportation or at least some muscle.

The printer is typical computer light grey. The scrap paper box with its translucent plastic front clips into position and resides above the dark blue slide-out for the roll paper feeder. Prints emerge at the top and fall into one of two optional paper bins or into a makeshift container. A status indicator with bright blue light is located at the top right-hand side. The scrap paper box catches the sliced pieces cut off at the start and end of each print.

The SL-D700 employs six cartridges using Epson's UltraChrome D6-S aqueous dye-based inks which have been especially developed for the printer. The cartridge capacity is 200 millilitres. The cyan, yellow, magenta, black, light magenta and light cyan inks enhance gamut and dMax characteristics to promote colour depth, intense blacks and brightness. Three cartridges reside on the left side of the printer and three on the right side.


A 152 millimetres wide roll of gloss paper loaded up and ready for the tray to be pushed into the printer.


Final cartridge in position prior to insertion.


Three cartridges reside on the left side and three on the right. The maintenance tank is located above the right-side cartridges.

As yet, no longevity ratings for the inks are available, however, as they are essentially the Epson Claria inks, a reasonable assumption would be 98 years displayed under glass and about 200 years in dark storage (based on Wilhelm Research data).

There are three print resolutions – 720x360 dpi is 'High Speed', 720x720 dpi is 'Standard' and 1440x720 dpi is 'High Image Quality'. The minimum droplet size is 2.5 picolitres. The choice between speed and quality depends on the project and consumer demand.

The printer employs Epson's 'Micro Piezo' print head technology with high resolution variable-sized ink droplets to deliver precise droplet placement. There is an auto nozzle check, a paper dust removal capacity and an auto cutter with long-lasting blade. An output heater ensures dry exit, especially with gloss media, to promote a finish resistant to damage and moisture. A choice of border or borderless printing is a feature. The printer accommodates paper widths from 102 to 210 millimetres and produces prints from 89 to 1000 millimetres in length.

With large-capacity cartridges, 65-metre long paper rolls and automatic features in a compact unit, everything is designed for low maintenance operation and medium volume output.

## Out Of The Box

The packing carton for the basic kit weighs 29 kilograms as delivered. It contains the printer unit, a five-metre USB cable, a power cord, a set of 200 millilitre ink cartridges, a maintenance tank, a set-up guide, Mac and PC drivers on CD, a media spindle and a warranty for one year. Surprisingly, no paper receiving tray or bin is supplied. There is a standard and large, optional bin available, but if the printer is not on public display an inexpensive plastic box from K-Mart will do the job just as well.

There are four broad purchase choices for the SureLab SL-D700 in addition to the optional extras. These comprise the printer with a standard one-year warranty, the printer with three-year warranty, the printer with a 'Photo Pack' and a one-year warranty, and the printer with the 'Photo Pack' and a three-year warranty. Any repairs or adjustments required under warranty are on an on-site basis for metropolitan areas.

The 'Photo Pack' includes Epson Order Control software, two six-inch wide gloss paper rolls, two eight-inch wide lustre paper rolls, an A4 roll, two media spindles, a media storage case and a maintenance tank.

The Epson Order Controller V3.0 software is a facility for print job estimations, print scheduling, image editing and colour management.

## Set Up

The printer supplied for this review was not brand spanking new so a detailed description of the set-up procedure cannot be provided.

Other reports indicate it will take about an hour to carefully go through each stage to bring the printer up to the 'ready to go' position. This involves insertion of the ink cartridges and paper, plus installation of software. Each ink cartridge has its designated slot and the printer will not accept anything in the wrong position.

The maintenance tank, located on the right side above the cartridge bay, is already inserted. This collects "stray" ink. The remaining service life is continually monitored. A low level warning message, as per each of the ink cartridges, will eventually appear to allow time for a replacement to be acquired. Initial ink charging time is about 20 minutes. A blue light continues to flash and will cease when everything is complete.

When the blue paper roll tray is slid out, the paper to be removed is backwound by turning the knob on the left of the paper insert position. The roll lifts out, the grey flange is removed and the paper is separated from the shaft of the spindle. Both of the internal and external paper guides must be positioned to accommodate the new paper width. The need to adjust the inner guide is not mentioned in the Setup Guide.

The paper spindle is colour-coded so the grey left side of the spindle corresponds to the left side of the take-up. It's important to ensure there is no dust on the leading edge of the roll, otherwise transportation lines could appear on the prints. The paper has the coated side facing down and is slowly fed into the receiving slot until a blue indicator shows

'OK'. Before the tray is closed, any slack in the paper is removed.

After a little practice, it takes only a minute or so to exchange a paper roll. In a busy mini-lab, more than one printer or rolls of different sizes and paper types already pre-loaded on spare spindles might be necessary.

## Paper Choices

A variety of 65-metre long paper rolls sizes and surface types are available. Widths are 102 millimetres (four inches), 127 millimetres (five inches), 152 millimetres (six inches), 203 millimetres (eight inches) and 210 millimetres (A4) in either gloss (254 gsm weight), lustre (248 gsm) or matte (180 gsm). The reverse side does not contain any brand imprint. This is a welcome feature for applications such as making greetings cards.

The lustre finish is likely to be the most popular. It has a bright surface without a high sheen and is versatile enough to suit a wide variety of projects. The gloss paper will bring out the best in any image and the full capacity of the printer with pronounced blacks and lively colour. It has the greatest impact, has that immediate appeal for quick sales at event venues and will compete well with gloss surfaces from traditional D&P outlets.

At 180 gsm, the bright white matte paper with its distinctive smooth surface is probably a touch too light for business and greeting cards. However, as the reverse side is virtually the same as the coated side, it does open up all manner of possibilities, including portfolio books with right-hand pages only. The reverse side will accept text so these pages can always be printed later in a standard inkjet printer. When fast printing is required, the fact that matte paper only has a 'High Image quality' setting could be a disadvantage.

## Print Panel

The SureLab SL-D700's 'Main' print panel controls the paper type, print quality, the paper size, border/borderless printing and 'Display Printer' status. Colour is either the default of 'Colour Controls' or 'No Colour Management' or 'ICM'. Proceeding to 'Advanced' on 'Colour Controls' allows sRGB or Adobe RGB colour space to be set and then any adjustments can be applied to 'Brightness', 'Contrast' and 'Saturation'.

When 'Advanced' is selected for 'ICM', it opens up to Basic, Advanced and Host settings, offers sRGB or Colormatch RGB colour space and, if 'Show All Profiles' is selected, the appropriate Epson SL-D700 profile can be locked in. There is no provision to name and save different settings, other than to change the original default.

## In Use

The SL-D700 is not a quiet machine. The paper transport mechanism hammers away while the whirring when it's in operation can be rather annoying, especially when the printer is positioned close to the computer. In a relatively quiet office, some means of printer isolation may be necessary.

The default 'Earliest' time between 'Stand By' and 'Sleep' is about four minutes. This may be altered from the 'Main' panel by clicking on 'Start SL Printer Maintenance Tool', then 'Operational Condition Settings', then'Power Saver', selecting a time and pressing 'Save'.

The first print sent to the printer involves a 'get moving' time of about 45 seconds before printing commences. The next different print still takes the same time, but if multiple copies or a run of images is involved there is no delay between each print.

My initial prints created via sRGB and Adobe RGB colour space and both Colour Controls or ICM had a good screen match. If colour or contrast aren't satisfactory, manual adjustments can be made. The paper cutter zips away to create a neat, clean cut at the start and end of each print. As the paper catcher is translucent, it's easy enough to see when it needs to be emptied.

## Print Times

Epson has compiled average and typical times for various combinations of paper types, print sizes and quality settings:

- Gloss/lustre – fast speed
- 545 per hour for 5.0x3.5-inches
- 430 per hour for 6x4-inches
- 140 per hour for 10-inches
- Gloss/lustre – standard quality
  455 per hour for 5.0x3.5-inches
- 360 per hour for 6x4-inches
- 120 per hour for 10x8-inches
- Gloss/lustre/matte – high quality
  225 per hour for 5.0x3.5-inches
- 180 per hour for 6x4-inches
- 60 per hour for 10x8-inches

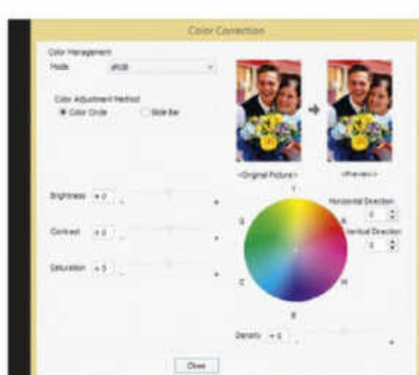
The average times (based on print head activity) on 302 millimetres lustre paper – at a 302x305 millimetres image sizing – were 25 seconds in the 'High Speed' mode, 35 seconds in the 'Standard' mode, and 65 seconds in the 'High Image Quality' mode.

Prints viewed at normal distances appeared to be identical and only with a magnifying glass could the finer resolution of the 'High Image Quality' prints be identified.

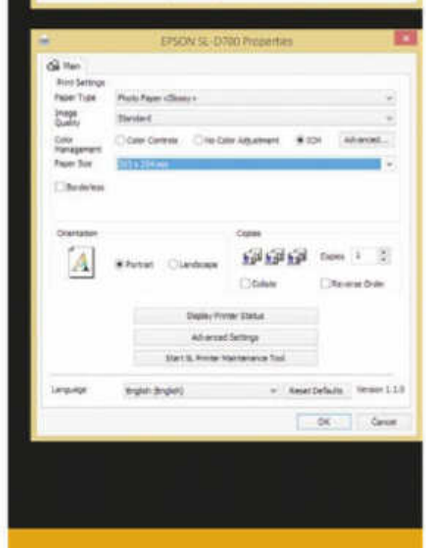
Twenty images created as 203x254 millimetres pages in InDesign and printed in a run took just nine minutes at the 'Standard' print quality. It took 65 seconds to print a panoramic landscape to 203x750 millimetres at 'High Speed' and 165 seconds at 'High Image Quality'. The difference in quality is hardly noticeable and would suggest that 'High Speed' would be appropriate for most of the time, with 'Standard' a fair compromise.

The largest print was made on the maximum paper size of 302x1000 millimetres (from the 302 millimetres wide roll), using an image size of 179x900

Colour management via 'ICM' allows the input profile of the image and the printer profile to be selected.




The main print panel establishes the printer settings.




# KEEP MOVING

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L&P

## SPECS EPSON SURELAB SL-D700 'DRY FILM' MINILAB

**Printer Type:** High speed 'dry film' inkjet photo printer for medium volume commercial applications.
**Ink Cartridges:** Individual per colour. 200 millimetres capacity. UltraChrome D6-S type. Colours are yellow, magenta, cyan, black, light magenta and light cyan.
**Nozzle Configuration:** 180 per colour.
**Minimum Droplet Size:** 2.5 picolitres with Variable-Sized Droplet Technology.
**Operating Noise:** 55 dB.
**Max. Print Speed:** 450 prints per hour at 100x150 millimetres size.
**Power Consumption:** 120 watts operational.
**Dimensions (WxHxD):** 460x354x430 millimetres.
**Weight:** 23 kilograms.
**Price (inc. GST):** Printer = $4795. Ink cartridges = $69.95 each. Maintenance tank = $22. 102 millimetres wide gloss paper roll = $41.25. 152 millimetres wide gloss paper roll = $63.25. 152 millimetres wide lustre paper roll = $63.25. A4 matte paper roll = $77.
**Distributor:** Epson Australia, visit www.epson.com.au

millimetres. As the intention was a display print for framing, the 'High Image Quality' setting was preferred. The printing time was three minutes and 40 seconds, and the result was a joy. A fascinating exercise was to throw 20 print files at the Epson SureLab SL-D700 as fast as I could bring them up in Photoshop and scale each up to print with white margins onto 203x305 millimetres lustre print size. The printer kept pace and didn't complain. I enjoyed that little game and ended up with a very pleasing mini portfolio of prints from my last Outback venture.

## Black And White

Black and white printing is not a strong point of the SL-D700, but considering the prime use of the printer will be for colour work, this is not likely to be an issue. Using the full colour inkset to produce a monochrome result – as per all the Claria ink printers – is not going to create neutral results as a very slight greenish cast eventuates.

Converting black and white files to RGB and printing as colour is a helpful technique. Otherwise, go for a deliberate tint by adding a touch of yellow and magenta in Photoshop or in the 'Colour Control' panel of the printer – select 'Slide Bar' instead of 'Colour Circle' and try adding three units of magenta and yellow, and decreasing the saturation by three. By experimenting with different settings, users will eventually settle on the best outcome for their needs.

## Event Photos

One of the advantages of the SureLab SL-D700 is its capacity to deliver photos on demand at any temporary location where a power supply is available. Images can be downloaded from a camera, viewed and selected in an image browser, and sent to the printer.

A crunch on time won't allow Photoshop-type adjustments, but being able to offer prints within a short time frame could fulfil a market need, either as prints now or orders taken on images that can be adjusted. The Epson Order Control software will assist in rapid picture assembly.

If none of the listed paper sizes is suitable, the 'User Defined 'panel allows a custom size to be created. This is then named and saved to the list. The maximum paper size is 210 millimetres wide by 1000 millimetres long. Photographers accustomed to printing at A4 would need to set the 210x297 millimetres size, name it as "A4" and save.

## Running Costs

The running cost per print will vary according to the paper used, the printer resolution and the image content. Figures provided by Epson relate to the gloss/lustre papers (matte is cheaper) per print and should be regarded as average.

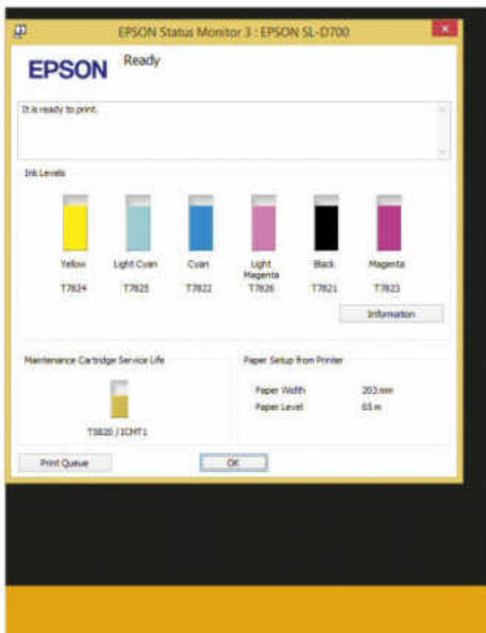
- 4-inches: 12-20 cents
- 5-inches: 20-25 cents
- 6-inches: 25-35 cents
- 8-inches: 55-65 cents
- 10-inches: 80-90 cents
- 12-inches: $1.50 - $1.70

As each 200 millilitres cartridge costs $69.95 (including GST), this works out to about $0.33 per millilitre. This is well under the usual $2.00 per millilitre for A4 and A3+ printers, and could well be an enticement to any photographer or organisation who don't require prints larger than A4 (or longer prints with 210 millimetres width) and who makes prints on a regular basis. By the same token, organisations like schools, small businesses or even larger camera clubs could find the running costs appealing enough to pursue a facility they might otherwise choose to forego or to fulfil with an A4 or A3+ printer. Apart from supplies of paper, ink and maintenance tanks, there is range of optional extras for SL-D700, including a stand and large paper catchers, spindles and a media storage box.

## The Verdict

The Epson SureLab SL-D700 is designed for high-speed and medium-volume printing operations. When top quality, high-resolution printing is required, it delivers. Although the printer is not specifically intended to target non-professional photographers, if A4 is the largest general print required, it could well appeal to organisations and institutions such as schools, art departments and the like. Relatively economical running costs and low maintenance levels are a strong feature while minimal training is required to operate the printer successfully. Portability will open up all manner of possibilities for the photographer working on location to not only capture images, but also to download to a laptop and have prints ready for sale, or for clients to preview. The print speeds of the SL-D700 cannot be denied, but at a temporary site or an event, the speed of organising files to direct to the printer would be the key issue.

The lack of a print catcher tray for the basic kit might seem unusual, but with a tall plastic box positioned under the paper exit prints, can collected in sequence. Apart from the noise and the slower printing times for matte papers, there is little else to detract from what should be an appealing unit for commercial enterprises and even some non-professional photographers as well.




The status monitor includes ink cartridge and maintenance tank levels, the current width of paper, length of paper remaining and the print queue where jobs can be paused or deleted.


EVOLVED
RECORDING
The all new H5. Built with an interchangeable microphone capsule system and ultra low noise floor preamps. Featuring 4 tracks of simultaneous recording, a shock-mounted X/Y stereo microphone that handles up 140 dB SPL and dual mic/line combo inputs - all in the palm of your hand.
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# Focusing On The Future

## LEICA SL

Leica has staked the future direction of its professional camera activities on an all-new mirrorless system using a full-35mm sensor and a new line-up of high performance lenses.

REPORT BY **PAUL BURROWS**

With the SL Leica is fully embracing the contemporary mirror camera design so the new camera has a built-in EVF, the capacity to record 4K video, touchscreen controls and both a built-in GPS receiver and WiFi.


**SLOWLY BUT SURELY LEICA IS MOVING** more into the mainstream as it works to expand its customer base and building on the reputation of its marque. The classic M-based digital rangefinder range continues and the S digital medium format system has its loyal followers, but it's on its mirrorless camera systems that Leica is basing any future expansion..

Following the consumer-level T is the pro-level SL which is partly targeted at the users left high-and-dry when Leica abandoned its 35mm SLR system, and partly at current users of high-end D-SLR users who might like a change from Canon or Nikon.

Similar in styling to an R Series SLR – specifically the R3 according to Leica – the SL employs a new version of the T mount – introduced in 2014 – called the L mount. The SL will accept T mount lenses – now renamed TL mount – automatically cropping the frame to the 'APS-C' format, but is designed to be used with a new family of 35mm format L mount lenses. Adaptors are (or will be shortly) available for fitting M, R and S lenses, the latter retaining autofocusing capabilities. With the SL Leica is fully embracing the contemporary mirror camera design so the new camera has a built-in EVF – with a world's best resolution of 4.4 megadots – the capacity to record 4K video, touchscreen controls and both a built-in GPS receiver and WiFi. While Leica's heritage is in rangefinder cameras, it has had plenty of involvement in reflexes, starting with the 35mm Leicaflex back in 1964 and continuing currently with the digital medium format S Series

cameras. Nevertheless, it's nailing its mirrorless colours very firmly to the mast, noting in the SL's brochure that the new camera "…puts an end to the arguments that spoke for holding onto old-fashioned single lens reflex technology".

In addition to its high resolution, the SL's 'EyeRes' EVF boasts a magnification of 0.8x and 100 percent coverage. It's a 0.66-inch panel with a refresh rate of 60 fps. Display options include a dual-axis level indicator and a choice of guide grids. The monitor is a fixed 7.5 cm back-lit LED panel with a resolution of 1.04 megadots and various touchscreen functions including focus point selection. There's also a monochrome LCD info read-out panel on the camera's top deck.

## Mounting Up

While the SL launches with just one dedicated L mount lens – similar to Sony's original Alpha 7 and the FE mount – Leica is emphasising the choice of lenses available via the various adaptors – 48 M mount, 16 S mount, 51 R mount, 21 PL mount cine lenses and six in the T/TL mount.

The first L mount lens is a 24-90mm f2.8-4.0 zoom – with optical image stabilisation – which will be followed by a 90-280mm f2.8-4.0 telezoom in mid-2016 and a 50mm f1.4 fast prime by the end of 2016. Incidentally, while it coincidentally shares a model designation with the Leicaflex SL from 1968, in this case "SL" stands for "spiegel los" in German which translates as "no mirror". It carries the Leica Type (or Typ) number of 601. Leica hopes to capitalise on the fact that neither Canon nor Nikon are offering a pro-level mirrorless camera system and it's targeting the potential buyers of the EOS-1Dx and D4S… or existing owners who are wondering what, if anything, might be coming next. Consequently, the SL boasts a rugged milled-aluminium bodyshell with full weather sealing and a 24 megapixels (effective) CMOS sensor mated with the same powerful 'Maestro II' generation processor as is used in the current S Typ 007. The sensor goes without an optical low-pass filter to optimise resolution and delivers a sensitivity range equivalent to ISO 50 to 50,000. Continuous shooting is possible at up to 11 fps (at full resolution) with a 2.0 GB buffer memory allowing for a burst of up to 33 RAW files captured in the Adobe DNG format. The SL employs a contrast-detection AF system which uses up to 49 measuring points with the option of Point, Field and Zone (using nine points) area modes. Auto tracking and face detection modes are available, and there's a built-in illuminator for low-light assist. Manual focus is assisted by a magnified image (up to 10x) and a focus peaking display which is available in a choice of four colours. Exposure control is based on a multi-zone metering system – as with the Q,


Chairman of Leica Camera AG, Dr Andreas Kaufmann (right), and company CEO Oliver Kaltner, at the launch of the SL mirrorless camera system at Leica's headquarters in Wetzlar, Germany. Photo by Kristian Dowling.


the number of segments isn't specified – with the option of centre-weighted average and spot measurements. The 'PASM' control modes are backed by +/-3.0 EV of exposure compensation, auto bracketing (over up to seven frames) and an AE lock.

The SL employs a conventional focal plane shutter with a speed range of 60-1/8000 second and a flash sync up to 1/250 second. Leica says a sensor shutter option will be added at a later date, presumably via a firmware upgrade. There isn't a built-in flash, but both a hotshoe and a PC terminal. Dual SD memory card slots are provided, one with UHS-II support – enabling data transfer at up to 100 Mb/second – and one with UHS-I support. The interfaces comprise a full-size HDMI (i.e. Type A) connector, PC flash, USB 3.0 and a proprietary audio interface for an adaptor module – yet to be released – which has 3.5 mm stereo audio input and output terminals.


The SL boasts some fairly serious video capabilities starting with Cinema 4K recording at 4096x2160 pixels and 24 fps, and UHD recording at 3840x2160 pixels and 25 fps (both in the Super 35 format). The Full HD resolution options – recorded full frame – include 100 fps and 120 fps slowmo speeds. A 10-bit 4:2:2 colour uncompressed output is available at the HDMI connection while 8-bit 4:2:0 colour is recorded internally. To optimise dynamic range for grading in post-production, a V-Log L gamma 'flat' profile setting is available and there's a zebra pattern highlight warning. The SL has built-in stereo microphones with adjustable levels and a wind-cut filter. There's a dedicated record start/stop button on the Leica's top panel, while all navigational functions are performed via a joystick-type control located on the rear panel.

The Leica SL camera body is priced at $11,000 and the Vario-Elmarit-SL 24-90mm f2.8 ASPH zoom lens at $6900 respectively.

SPECS

## LEICA SL (TYP 601) $11,000 BODY ONLY

**Type:** Fully automatic professional digital camera with Leica L bayonet lens mount.
**Focusing:** TTL automatic with contrast-detection measurement using 37 or 49 focusing points. Auto point selection, moveable single point, field and zone (nine points) modes. Manual switching between single-shot and continuous operation. Face detection and 'Touch AF' modes. Sensitivity range TBA. Low light/contrast assist provided by built-in illuminator. Manual focus assist via magnified image and focus peaking display (choice of colours).
**Metering:** Multi-zone, centre-weighted average, spot and TTL flash. Metering range is EV 0 to 18 (ISO 100/f2.0).
**Exposure Modes:** Continuously-variable program with shift, shutter-priority auto, aperture-priority auto and metered manual.
**Shutter:** Electronic focal plane, vertical travel, metal blades. 60-1/8000 second plus 'B' (up to 30 minutes). Flash sync up to 1/250 second. Exposure compensation of up to +/-3.0 EV in ½ or 1/3 stop increments.
**Viewfinder:** 1.67 cm EVF with 4.4 megadots resolution. 0.80x magnification and 100% vertical/horizontal scene coverage. Automatic/manual switching between the EVF and the LCD monitor screen. Eyepiece strength adjustment built-in.
**Flash:** No built-in flash. External flash units sync via hotshoe or PC terminal.
**Additional Features:** Milled aluminium two-piece body and chassis sealed against dust and moisture, monochrome camera read-out display, auto exposure bracketing (up to +/-3.0 EV per frame over three, five or seven frames), AE lock, dual-mode self-timer (two or 12 second delays), audible signals, auto power off with adjustable timing. Accepts Leica T/TL mount lenses for capture in the 'APS-C' format. Accepts Leica M, S and R mount lenses via adaptors.

**DIGITAL SECTION**
**Sensor:** 26.3 million pixels (24 MP effective) CMOS type with 24.0x36.0 mm imaging area. No optical low-pass filter. Sensitivity equivalent to ISO 50-50,000.
**Focal Length Increase:** None.
**Formats/Resolution:** 8-bit JPEG compression on three resolution settings; 6000x4000, 4272x2848 and 2976x1984 pixels. RAW files captured at 6000x4000 pixels in the Adobe DNG format. RAW+JPEG capture. 24-bit RGB colour for JPEGs, 42-bit RGB colour for RAW files. Choice of six aspect ratios – 3:2, 7:5, 4:3, 1:1, 3:1 and16:9.
**Recording Media:** Dual slots for SD/SDHC/SDXC memory cards with UHS-II speed support for Slot 1 and UHS-I support for Slot 2.
**Video Recording:** MP4 format at 4096x2160 pixels (Cinema 4K), 24 fps and 16:9 aspect ratio; 3840x2160 pixels (Ultra HD), 30 fps or 25 fps and 16:9 aspect ratio; 1920x1080 pixels (Full HD); 60, 50, 30, 25, 24, 100 or 120 fps (PAL, progressive) and 16:9 aspect ratio; 1280x720 pixels; 60, 50, 25, 30, 100 or 120 fps (PAL, progressive). MPEG-4 AVC/H.264 compression. MOV format at 3840x2160 pixels (Ultra HD), 30 fps or 25 fps and 16:9 aspect ratio; 1920x1080 pixels (Full HD); 60, 50, 30, 25 or 24 fps (PAL, progressive) and 16:9 aspect ratio; 1280x720 pixels; 60, 50, 30 or 25 fps (PAL, progressive). MPEG-4 AVC/H.264 compression. Uncompressed 10-bit 4:2:2 colour 4K/2K output via HDMI connection. Stereo microphones built-in with auto/manual levels control. Stereo audio input and output (3.5 mm) available via optional AA-SCL4 Audio Adapter. Maximum recording time is 29 minutes and 59 seconds. Maximum file size is 4.0 GB.
**Continuous Shooting:** Up to 65 JPEG/large frames (as tested) at 11.0 fps or 33 RAW. Medium speed mode operates at up 7.0 fps Low speed mode operates at 4.0 fps
**White Balance:** Auto control with eight presets, one custom preset and manual colour temperature setting (2000 to 11,500 degrees Kelvin).
**Interfaces:** USB 3.0, HDMI (Type A), multi-connector, PC flash.
**Additional Digital Features:** Sensor cleaning, fixed 7.62 cm LED monitor (1.04 megadots resolution) with touch controls, 2.0 GB buffer memory, sRGB, ECI RGB and Adobe RGB colour spaces; real-time histogram display, guide grids (choice of two), V-Log L gamma profile for video recording, in-camera JPEG adjustments (contrast, colour saturation and sharpness), monochrome capture, zebra/highlight warning displays (selectable levels), multi-shot HDR capture, dual-axis level indicator, intervalometer (up to 9999 frames), audible signals, 12/30 thumbnail displays, copyright information, adjustable image display time, playback zoom, auto power-off (adjustable duration), four user profiles, built-in WiFi, built-in GPS receiver. Optical image stabilisation built into L mount lenses.
**Power:** One 7.2 volt, 1860 mAh rechargeable lithium-ion battery pack (BP-SCL4 type).
**Dimensions (WxHxD):** body only = 147.0x104.0x39.0 mm.
**Weight:** 771 grams (body only without battery pack)
**Price:** $11,000 body only. $17,900 with Leica Vario-Elmarit-SL 24-90mm f2.8-4.0 ASPH zoom lens.

**Distributor:** Leica Camera Australia Pty Ltd, telephone (03) 9248 4444 or visit www.leica-camera.com

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